# Light and Lighting

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## CONTENTS



# The Advancement of Lighting

THE first number of this journal was published in January, 1908, and was priced one shilling; now—in its forty-eighth year—the journal costs twice as much. But, such has been the change in the value of money in almost half a century that the journal is more than twice as cheap now as then. Of more importance than the cheapening of lighting literature is the cheapening of lighting itself—at any rate, of artificial lighting. Even less than 30 years ago there were areas within 20 miles of London where electricity for domestic lighting cost 10d. a unit, and, of course, the available lamps were less efficient than are those of to-day. Lower supply charges and more efficient light sources have made good lighting relatively cheaper than poor lighting was when this journal made its début. Perhaps it is to these changes, even more than to consumer enlightenment as to what constitutes good lighting, that we owe the widespread betterment of artificial lighting that has unquestionably occurred in recent years. Nevertheless, more enlightenment—in both senses of the word—is needed, and it may be hoped that 1955 will be a fruitful year in this respect.

# Notes and News

## Homes . . .

Published in the I.E.S. Transactions this month is the paper on home lighting by Young and Misselbrook and the discussion which took place on it at Southport. For some time now there has been talk in lighting circles about introducing fluorescent lighting into the home and the authors of the paper quite properly had something to say about it; in fact they gave five very good reasons why fluorescent lighting is making so little headway in this direction.

To tell lighting engineers that their beloved fluorescent lamps are no good for some application or other is of course inviting them to prove the reverse —and at Southport there was no lack of people who tried to do so. One cannot blame the lighting engineer for trying to get these lamps into the home and one day maybe, when he has solved the problems expounded by Young and Misselbrook (plus one or two others) he may succeed. But the paper was concerned with home lighting in general and only about one-sixth of it dealt with fluorescent lighting whereas the discussion was far more heavily weighted on this side. As the authors pointed out the number of homes in which fluorescent lighting is installed is infinitesimal; a campaign for better lighting in homes is certainly needed but it should, in our opinion, be based on the use of incandescent lamps with which everyone is familiar. Too great a preoccupation with the possibilities of fluorescent lighting at this stage only confuses the real issue. What is really wanted is a combined effort on the part of the manufacturers, electricity boards, suppliers and contractors to tell people how much brighter and more cheerful their homes could be for an almost negligible cost.

Extraordinary though it may seem to some of us, the majority of people still think that lighting is terribly expensive; they use the smallest lamp possible and seem to switch it on only when absolutely necessary. The habits of the war years tend to die hard but one has only to walk along a residential road at night to see how few people think it necessary to light their hall or porch; some people would rather risk their neck than spend another penny or two a year on light.

Now that the electricity boards are so busy standardising supply at 240 volts might be a very good opportunity for them to tell their consumers some of the basic facts of light.

## . . . and Shops

Is it true that lighting engineers are not interested in the lighting of shops? We doubt it—but we can well believe that many of those, particularly the display people, who were present at the recent paper by Tate to the I.E.S. went away with the impression that the lighting engineer couldn't care less. We understand that I.E.S. members have hinted from time to time that they like at least an occasional practical paper but when one, and a good one, is served up for them they remain strangely aloof in the discussion. Shop lighting *is* a controversial subject and no one knows that better than Tate. We expected to hear plenty of arguments during the discussion but were extremely disappointed. Perhaps the lighting types wanted to get home to their TV to see the Arsenal-Spartak game—which was just too bad for the display people who wanted to hear the lighting engineers' views on their problems.

## Sign Competition

The Electrical Sign Manufacturers' Association announces a competition for the best designs of an illuminated sign display on a factory specially drawn for the competition by a well-known architect. The first prize is £100, second prize £50, with three runner-up prizes of £25 each. The competition is open to any individual and at least one prize will be awarded to an amateur designer. Designs will be judged on advertising value, architectural harmony, contribution to the improvement of electric sign design, daytime appearance, identification and directional value, and practicability.

The closing date of the competition is January 31. Full details and entry forms can be obtained from the Electrical Sign Manufacturers' Association, Kingsway House, 103, Kingsway, London, W.C.2.

## Brussels International Exhibition

It is announced that Britain will be taking part in the 1958 Brussels International Exhibition, work in preparation for which has already begun. The exhibition will be open from April until October, and will be held on a site of 450 acres about four miles from the centre of the city. It will be the first major international exhibition for nearly 20 years.

No doubt there will be plenty of opportunity for lighting to be used, and it is to be hoped that British developments will be well to the fore.

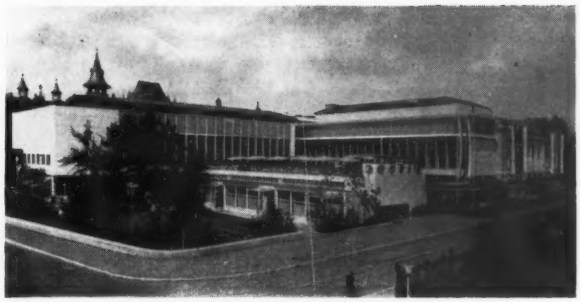
# C.I.E. Meeting in Zurich

Information is now coming through from Switzerland on the organisation of the thirteenth plenary meeting of the International Commission on Illumination (C.I.E.) which is to take place in Zurich from June 13 to 22.

As we reported some time ago the technical meetings will take place in the Kongresshaus, which is probably one of the finest buildings of its kind. In addition to the very necessary congress halls and meeting rooms it contains restaurants and bars (listening to other people talking can be very thirsty work) so that delegates can confer both formally and informally in comfortable and pleasing surroundings.

The technical programme is not yet available but it is understood that the meetings will be arranged in two parallel sessions. The programme of business is likely to be a heavy one and most of the social arrangements, other than those for the ladies, have been planned to take place in the evenings. These will include a trip on the Lake of Zurich to Rapperswil, a visit to the Zurich airport at Kloten, and a banquet. One afternoon and evening towards the end of the meeting there will be a visit to Berne. On Sunday, June 19, there will be a full day excursion by boat and train via Lucerne to the Bürgenstock, a promontory on the Lake of Lucerne the top of which (2,880 ft.) is reached by cable railway.

Already some 120 delegates and ladies from Britain have indicated their intention to be present at Zurich.



*The Kongresshaus, Zurich.*

*The Lake of Zurich from the Bürgenstock.*

*A street in Berne and the Cathedral spire.*

*The Lake of Zurich. The Kongresshaus is just off to the right on the side of the lake.*

*The Lord Mayor's Banquet, Guildhall.*

# Random Review of 1954

By A. G. PENNY

Random Review becomes more and more difficult to compose every year; a chronicle of events or announcements in the lighting world is simple enough—only the plodding perusal of published papers. But it is not so easy to introduce a critical—and helpful—commentary without displaying the limitations of one's stable of personal hobby horses; the same old nags tend to appear year after year. On the other hand it provides an excellent occasion for reviewing the new horses that one has acquired, some of which may have been bought with little thought of the consequences !

Although I have for many years had an interest in both standardisation and new developments (superficially, of course, one is the antithesis of the other) I must confess that new developments have in the past seemed not only the more interesting but also the more worthy of effort. Of recent years, however, I have been involved more and more in matters of standardisation and have come to realise the very real importance of this work to the user of light. The real or imagined cost of light is a fundamental bar to its wider use and standardisation is one certain way of reducing costs. In brief, Johnny wants the same light for doing his homework as does cousin Jim in Canada (his eyes and his homework aren't very different) but he does not use the same lamp because Britain and Canada have different standards. So not only do British lamp exporters have to make special lamps for Canada but British fittings makers have to make fittings for the Canadian market which not only reflect Canadian views on appearance and style but also take Canadian lamps. Of course, if you want to keep the foreigner out there's nothing like peculiar local standards to discourage him, especially when rigidly enforced by National Test Houses; they are better than a 10 per cent. protective tariff any day and not nearly as noxious in these days of G.A.T.T. (General Agreement on Tariffs and Trade) and other political platforms for displaying international co-operation. But for the British who live only by virtue of international trade, international standardisation is a real and unquestioned necessity.

Of course, standardisation, like so many things, must be taken in moderation. Nobody should want to force every country to make and use articles precisely the same in every respect. But there should be agreement about certain fundamental matters—agreement on units and methods of measurement, on such questions as dimensional interchangeability (as between plugs and sockets, lamps and lampholders for instance) and on factors affecting safety (such as temperature rise of motors, insulation of cables, etc.). Perhaps minimum standards of quality are also worth standardising although on this point I have some personal doubts; too frequently minimum standards created in this way tend to become the accepted official standard to the detriment of both the maker and would-be user of a better product.

But I am all in favour of every maker having to declare the quality of his product according to an agreed formula and for the establishment of reliable, independent methods whereby his claims can be checked and the results (favourable or unfavourable) published for all to read. It may be that a practicable method will be difficult to find, but I think it would help the user to judge the rival claims with which he is beset. It would add weight to the claims of the big fellow—if justified. Similarly some system of official recognition of quality

would, I believe, go a long way to help the newcomer with a good product. Certainly I am sure it is a better way in (or up) than by selling at a lower price than the established makers. If an engineer thinks it worthwhile to achieve recognition of his quality by passing an examination why should he not seek similar recognition for his product?

Having said all this I must be frank and add that so far as I know no system has yet been evolved which gives the user half the protection he can get by confining his purchases to the products of a firm with a good reputation. But there ought to be.

### Society's Activities

1954 was a sound year so far as the I.E.S. in this country is concerned. General opinion seems to have been that the technical papers, presented both in the spring and autumn, were at least as good as usual; the Summer Meeting was the best ever; and there has been a notable influx of new members. On the other hand there have been a larger-than-usual number of resignations, and in some parts of the country interest has dwindled sharply.

Before commenting on the successful side it is, I think, worth a few minutes to contemplate the problems of provincial enthusiasts, if only to realise the inevitable limitations of a small society. Any society, large or small, depends for its success on a small band of enthusiasts who are willing, for a variety of reasons, to devote what a rational person could only regard as an unreasonable amount of time, money, and energy to keeping the society alive. Even in a small city enough enthusiasts can often be found, but the problem is so frequently that of reconciling the views of the enthusiasts as to how the society should be run. Not always are the reasons which motivate the enthusiasts quite as pure and unbiased as is necessary. Some members have ideas which are entirely too grandiose; some imagine that senior and eminent members of the society sit in their offices waiting for an invitation to give a lecture with a van full of demonstrations or that the president (not to mention V.P.s) can alter the date of his visit at a moment's notice.

And, above all, much of the work a local secretary has to do can never be delegated. Some one individual has to keep the rival interests in check, to look after the manifold matters of routine and to maintain that unity of purpose and continuity of action without which no organisation (especially a voluntary one) can continue in being.

The fact has to be faced that good secretaries are very scarce indeed and hard to find. Not to put too fine a point on it, the activities of a society in any particular area are determined not by the number of members but upon whether there is in the area an individual who can be persuaded to act as secretary, and will do a good job. Where the secretary is, there the membership will grow and the society prosper. I think we all tend to forget that membership of any society is either work or is in the nature of a hobby, i.e., something that we like doing, something to which we willingly devote time and money fully conscious that, just as in other sports and hobbies, not all our time will be pleasurably spent. Nevertheless, too many of the firms in the industry seem to think that all they need to do is to support the I.E.S. financially. This is no occasion for enumerating the benefits firms derive directly and indirectly from the I.E.S., but more could and should be done by senior people personally to participate in the affairs of the society and to let their youngsters know that good work for the I.E.S. will be rewarded when the annual review of salaries takes place. (And a private hint to the unknown but aspiring lighting engineer. The local I.E.S. secretary knows all the local employers personally—and so does his assistant).

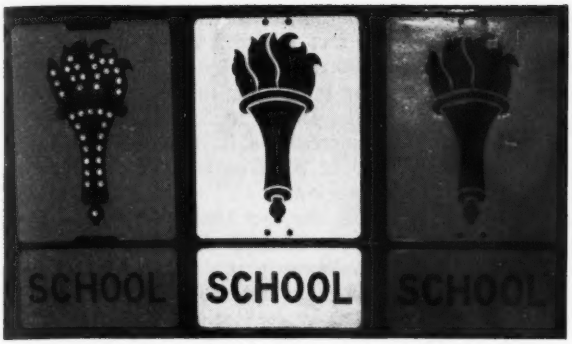
Of course, those whose work is associated with some form of light or lighting and who get little or no pleasure out of it will naturally get no pleasure from membership of the I.E.S. and, indeed, are better away from it. But equally there are many people not connected with the industry who have some interest in light, and I frequently think we should make greater efforts to widen our activities to attract them. Home lighting, for instance, is a subject continuously appearing in the many periodicals devoted to the decoration and furnishing of our homes, so it obviously interests most of the women of this island. Yet you and I know how appallingly badly lighted are the homes of our neighbours. (Is your own home lighting good enough?) Why should not the I.E.S. take the initiative in bringing good lighting to the homes of England? What about public lectures?

As the new president, Mr. E. C. Lennox, so bluntly stated in his presidential address, there is hardly anything used in the home cheaper than light, yet an insignificant proportion of the nation's income is spent on lighting. Now that there is a little more money about (so I'm told) we should make a real drive to eliminate inadequate lighting.

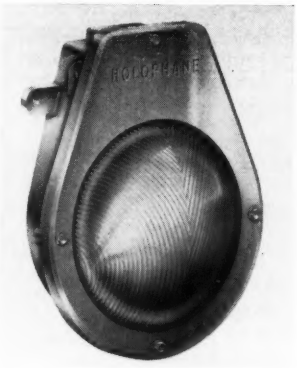
There are indications that this potential market will soon attract more forcibly both those interested in supplying equipment and those supplying electricity, and with this will come a demand from the user for guidance as to how best to make his or her own judgment. Perhaps this is something about which the I.E.S. and the E.A.W. could collaborate. Whatever the solution there can be no doubt that Mr. Lennox put his finger on an aspect of lighting about which the I.E.S. has no occasion for complacency.

On the credit side of the year's I.E.S. activities we have to note a succession of papers of real merit and we have to congratulate the Papers Committee (Chairman, David Strachan) on an excellent selection—not forgetting also the unseen Editor of the Transactions, whose assistance most authors are only too glad to have. Mr. J. M. Waldram is to be congratulated for again demonstrating his versatility by gaining the Leon Gaster Memorial Premium for a paper *not* about streetlighting. The concept of "apparent brightness" is something that has been badly needed for many years, and I am very glad that its infant welfare should be in such capable hands.

Mr. Waldram stresses that the appearance of an interior is the architect's responsibility and not the lighting engineer's. The architect is concerned with the colour and apparent brightness of objects, and if he will specify what he requires the lighting engineer must be able to calculate the actual brightnesses required to give the desired result and to devise a lighting installation to achieve them. The method proposed by Mr. Waldram may seem rather lengthy, but in practice it is usually necessary to carry it out for only a few points. It has already given good results in a number of installations. One of the main advantages is that it obviates the necessity for costly trials and "mock-ups." I look forward




*Road signs by night. Left, stove enamelled; Centre, reflective; Right, vitreous enamelled.*
*(Gowshall photo.)*



*House-side lantern.*
*(Holophane photo.)*

*Cold cathode street lighting, Aberdeen.*
*(G.E.C. photo.)*

next to a paper about a new approach to home lighting (or will Mrs. Waldram oblige ?).

About the successful Summer Meeting there is little that I can add to what readers already know (except to remark that Guy Campbell and I will be taking our own bicycles to the next meeting*). I have been very interested to observe the reactions to the rather more crowded programme than heretofore. Should one have a limited number of papers which can be properly discussed or should there be an overcrowded programme which attracts more people, but does not satisfy them when they get there ? It's not an easy question to resolve, for although the first alternative seems the obvious one, it must be remembered that much of the value of a conference lies in the opportunity of talking " shop " with other interested people and, especially for the more junior members, of meeting and learning from the older experts. Notwithstanding a social programme crowded with opportunities for relaxing in a variety of ways, the amount of " shop " talked is astonishing. And obviously there is nothing better than a paper by an expert to start the " shop " and to ensure the attendance of those interested. A limited number of papers always involves the risk of people who are not directly interested thinking that the conference does not justify their attendance.

The question is, of course, not a new one and has plagued conference organisers for a long time; the real answer is, I suppose, to have a judicious mixture, arranging some sessions to permit extensive discussion and to fill others with a series of complementary papers that are in themselves a discussion of the problems. One such session at Southport on industrial lighting was, I thought, particularly stimulating. Down-to-earth calculations of lighting costs are rarely enough to keep me awake even after a hotel lunch, but the refreshingly different approaches of Messrs. Jones, Levey, Clark and Howe were a welcome alternative to the excessively polished papers to which we are more accustomed. A little more disagreement about lighting would do a world of good. And, of course, when writing about Southport it is impossible not to mention the exhibition of the Gallic method by M. Claude—a conference in himself and a convincing argument for the British system; who would want to (even if he could!) restrict M. Claude to ten minutes? After his example we look forward to M. Jean Chappat in person next May on the lighting of French chateaux.

Another undoubted success at Southport was the revived display of equipment. But more time for inspection, please.

Amongst the less noticeable activities during Mr. Stevens' year of office I should mention the interim report on measures to avoid eyestrain in cinemas with wide screen projection, which is not only valuable but a good example of I.E.S. initiative.

The 1954-55 season now well under way looks like being a more " practical " one than usual. Indeed, with only a few exceptions the lecture programme seems essentially one for lighting engineers. I wonder if this is the combined effect of so many of the provincial chairmen being concerned directly with lighting. Not that there was anything " down-to-earthy " about the welcome my wife and I received from the chairman of the Birmingham

* This remark will only be intelligible to those who went to the Mayor's reception at Southport and is not to be taken seriously. Nor should reports that Guy has sold his vintage Bentley be construed to mean that he is taking up cycling seriously.

*Ferranti transformer factory, Hollinwood, lit by 8-ft. 125-watt hot cathode lamps.* (*Metro-Vick photo.*)

Centre when we were guests at their Ladies' Night. And if Birmingham can attract 150 to a dinner-dance surely London can expect 300 next April.

A conference missed was the International Conference on Display at the L.S.B. in September, which, I gather, would have interested a large number of I.E.S. members. There should be more contact between our Society and the display industry.

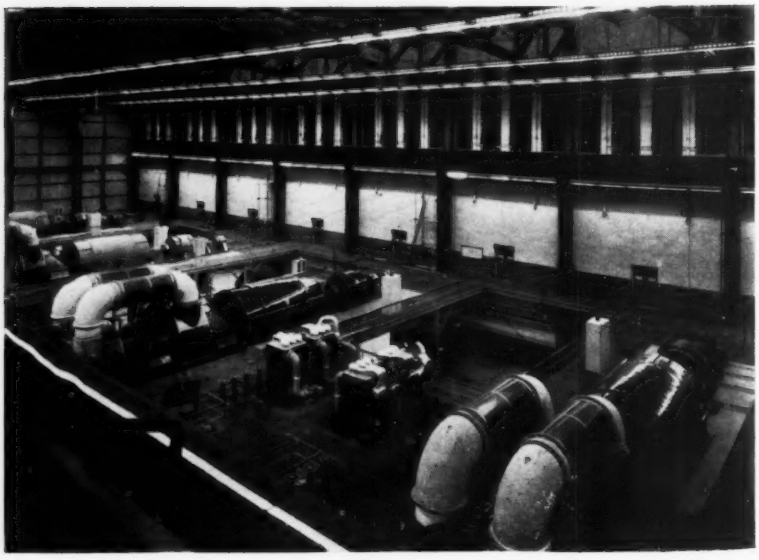
Also I must lament the fact that no Britisher went to the German I.E.S. conference, despite the fact that some entirely new developments in discharge lamps were featured. Quite apart from light sources there is a lot of lighting development in Germany to-day.

Among conferences I was able to attend was that of the American I.E.S. in Atlantic City (which unfortunately just failed by one day to clash with the selection there of "Miss America"). Apart from this initial disappointment the conference was very stimulating and not nearly so "commercial" as I had been led to believe. True, some manufacturers of equipment and suppliers of electricity were occasionally mentioned by name, but I thought the restraint was very considerable, especially when it is borne in mind that the temptation to advertise is great greater than in Britain. (A much larger proportion of the members of the American I.E.S. are buyers of equipment than is the case in our Society.) At the risk of being thought heretical I cannot conceal the thought that a certain amount of commercial irritant is a very good stimulant—like the essential impurity* that makes an inert powder fluoresce.

Perhaps the matter of greatest interest to a British visitor was the attention now given to mercury street lighting. As many know, street lighting techniques in the States at the end of the war had hardly changed since series burning tungsten lamps were installed in semi-cut-off fittings 30 years ago. But in the last few years mercury has swept the country, and although the light distribution is still little altered, the use of more powerful light sources has changed the appearance of many towns.

In little more than three years the States have installed

* I hope my commercial colleagues will not take umbrage at the use of this word !



*B.E.A. generating station, Rye House, lit by 5-ft. 80-watt hot cathode lamps.* (*Thorn Elec. Industries photo.*)

*B.E.A. generating station, Portishead, lit by 1,000-watt MB/V mercury lamps. (G.E.C. photo.)*

a quarter of a million mercury lanterns—more than all the mercury and sodium lanterns put up in this country over the past 20 years! Sodium is little used on account of colour, although I suspect that when more consideration is given to modernising the lighting of side streets, the economics of the European type of sodium lamp will cause some surprise.

For the moment, however, mercury has it nearly all the way. A notable difference from British practice is the use of quartz inners for both 400-watt and 250-watt lamps. The higher efficiency is apparently considered worth while despite the fact that the quartz lamps are nearly twice the price of the hard-glass types. And there can be little doubt that this use of quartz has eased the way for the colour-corrected lamps which now attract so much attention. When you have got used to buying 400-watt lamps for $17 it's worth paying $21 for colour correction—certainly much easier than changing from plain mercury at 59s. to colour corrected at £9 (of which more anon).

It is, however, unwise to compare economics in one country with those of another, because the basis of all such calculations is largely determined by local conditions. Expenditure in this country on street lighting is largely a national affair through the operation of Ministry grants, whereas in other countries it is often a local—even parochial—matter.

The interest of Americans in a good colour and the intolerance of even a moderate amount of glare naturally eases the introduction of fluorescent street lighting which, after a shaky start, is now making some progress. General Electric is making an effort to improve the appearance by clamping the unit right at the top of the pole without any struts or tiebars to keep it horizontal. Unfortunately the unit is built around four 6-ft. 100-watt tubes, so that although elegant it is even longer and more obtrusive than the normal British versions housing 5-ft. tubes.

Of the many other subjects (28 papers were presented in four and a half days!) the session that intrigued me was the contest entitled "My Most Interesting Lighting Job in 1953." Throughout the past few months each region of the American I.E.S. had been having an eliminating contest amongst its members, with the result that 10 finalists out of over 200 competitors came to Atlantic City to describe in a few minutes their most interesting job during 1953. The contestants used a wealth of magnificent colour slides and described their jobs with a clarity and succinctness which would have done credit to a top-rate radio commentator. Lest anyone should think that a job has to be big to command attention in the States, I should mention that one of the finalists described the lighting of a small church which only spent £5 on lighting equipment, whilst the winner described a tube inspection unit using only one 15-watt lamp!

Canadians play a considerable part in the American I.E.S. activities through the Canadian Regional Section. Roy Eshelby, whom many British I.E.S. members will remember in London before the war, gave a lecture about Coronation lighting, and the president, Duncan Jones, is a Canadian.

**Lamps**

The advances in mercury lamps in the U.S.A. for street lighting have already been noted, as has the development of 6-ft. 100-watt fluorescent tubes. The trend in fluorescent tubes is now quite clearly away from low wattage, low brightness tubes such as the 4-ft. 40-watt towards tubes loaded up to 800-1,000 milliamps, i.e., in line with the normal British 80-watt tube. The greatest interest is, however, in an 8-ft. 1½-in. tube virtually the same as the British 8-ft. 1½-in. 125-watt tube—except for the caps. There the "hazard" of more than 230 volts on the lamp has persuaded American makers to develop a special cap and holder in which the contacts cannot be touched either when the lamp is in position or during insertion.

The lamp was originally developed as a "slimline" low brightness tube—the hot cathode equivalent of cold cathode tubing—but with the increasing demand for more light the current rating has been raised from 120 milli-

amps through 200 and 300 to 425 and now up to 800-1,000 milliamps. The effect of increasing current is, of course, to increase the light output but the efficiency in lumens per watt falls off somewhat. This has stimulated American lamp makers to consider the introduction of krypton and argon-krypton mixtures instead of plain argon filling and to explore the possibilities of reduced gas pressures. The results to date indicate nearly 70 lumens per watt initially in Standard Cool White (British "Daylight") but at some cost in lumen maintenance and watts lost in the ballast. Stores, super markets and petrol filling stations are amongst many places where these lamps are already in widespread use. It may well be that these developments will stimulate a growing use of the 8-ft. lamp in this country where for so long it has been acting the part of Cinderella.

Needless to say, reflector spotlamps continue in the U.S.A. with unabated popularity both for accent lighting in stores and shop windows, and for general lighting in restaurants, hotels and other places where the craze for dark ceilings still holds sway. Indeed, perhaps one of the noticeable features of America is the range in ceiling brightnesses from that of luminous ceilings giving over 50 ft.c. to the "deep, dark and dirty" bars where drinks are dispensed with the aid of a pocket torch (no kidding!) and not even the most dark-adapted eye can read the price list.

So far as Britain is concerned it is perhaps too early to pass detailed comment on the new 400-watt colour-corrected mercury lamp, though its introduction does significantly mark an extension to the range. Last year at this time the 80- and 125-watt lamps had just been introduced, and it can be said that the demand for them has shown a cautious enthusiasm. Undoubtedly the new technique of colour correction shows a great improvement *per se*, and the 400-watt lamp with increased efficiency as well should prove most attractive for both industrial and many street lighting purposes. The new fluorescent powders require activation by the radiation from a quartz discharge inner, and drastic revision of manufacturing technique will certainly result in still further extension of the available range and reduction in lamp prices.

Unquestionably the mercury lamp of the future is the quartz type, supplied with colour correction in a complete range of wattages. And even today, the 400-watt MBF lamp, for all the criticism of its high selling price, is in fact a remarkably attractive proposition. The new MBF lamp compares favourably with the earlier MAF type on the score of running costs alone, quite apart from the obvious improvement in appearance and colour rendering. And the warnings of the B.E.A. that we will be increasingly concerned with rising energy costs must be kept in mind. Although the new lamp is not quite an economic competitor with the ordinary 400-watt lamp it is not so far away, and compared with other sources of good colour it makes a very brave showing indeed. The increasing use of the Dual lamp is another indication of the growing interest in good colour.

Fluorescent tube colours continue to be a source of unending perplexity to some, and the two latest arrivals bring problems of their own. The New Warm White and Deluxe Warm White colours are as unlike as their names are similar, except that they both appear "yellow white" rather than "pink white." Have we yet reached the point where these are the two colours to end all colours?

The New Warm White tube with its very high efficiency is in the nature of a problem child. Industrial and street lighting installations are ideally suited to its use, but where offices and business premises are being painted with aesthetic avoidance of the unending cream and brown or green, they deserve to be lit with a tube of rather better colour-rendering properties. With a deceptively attractive colour appearance giving a reasonable simulation of tungsten lighting, it is nevertheless liable to be used in many interior installations for which it is really quite unsuited. For shops and stores, for instance, it should always be used mixed with tungsten "accent" lighting.

The Deluxe Warm White is virtually an admission of defeat and a highly successful one at that. Apparently the tungsten lamp still reigns supreme, and at least for all social and domestic lighting purposes the Deluxe tube is a very satisfactory alternative—or supplement—both from its appearance and colour-rendering properties.

A special lamp to make its mark this year must surely be the 10-kw. Studio lamp now in common use in film studios throughout the world. It is an interesting study to reflect how changes in film technique and material can over-night bring about the obsolescence of a light source. The coming of sound finished the arc—too noisy—then the advent of Technicolor killed the "inky"—not enough light for the slow colour film—and now the "inkys" are back again because the colour temperature of arcs is too high for the new and faster colour films. They are not of course so fast as black and white stock so it is necessary to light film sets to around 1,000 ft.c. if adequate definition is to be obtained with the wide screen pictures now being produced. To the actors and technicians 1,000 ft.c. is considered hellish hot but to a lamp maker the rows of 10-kw. lamps look like Heaven!

### Lamp Economics

Glancing through the last 12 copies of *Light and Lighting*, I could only find two advertisements relating specifically to lamp life. In one, a definite figure of average life was quoted and the other, without stating any figure, merely provided what I thought to be the neatest answer to the thorny problem of how long a lamp *should* last. We are told it pays to advertise, and this must mean to advertise the particular selling points (the better colour, the increased efficiency, the firmer cap or even the very newness) of our product; so I can only conclude that lamp life is now regarded by the makers—and more important perhaps, by the market in general—to be satisfactory and therefore not worthy of comment.

For all this, there were several references to lamp life in the Summer Meeting papers and, whilst some of the figures were hotly contested, it remains evident that the service life of all types of lamp does vary widely, both below and above the objective average figure. The many critical factors affecting incandescent lamp life are now well known and it is rare to find an installation in which the factors have not been taken care of so that the designed life is obtained. Discharge lamps on the other hand are so much less sensitive that it is often assumed that they can be ill-treated with impunity. But some factors exist such as switching frequency and the sulphur content of industrial atmospheres which must be carefully

*Top*: *"Ensphere" industrial lighting fittings with catenary connection.* (*ELECO photo.*)

*Right*: *Simple but effective lighting in a shoe shop.* (*Thorn Elec. Industries photo.*)

*Below*: *Landport Drapery Bazaar, Portsmouth, showing "self-selection" lighting.*
(*Courtney Pope* (*Elec.*) *photo.*)

considered in assessing (or justifying) the lamp life in any particular installation.

Perhaps this apparent indifference to actual lamp life is in fact a healthy sign—an indication that the user is now seeking maximum economic value rather than minimum lamp replacement charges from his installation, charges which represent only one of the many independent variables affecting the economic operation of any lighting scheme. But from the lamp maker's point of view there is much to commend accurate lamp life records. To him, good life is the surest guarantee of future orders whilst premature failures, properly recorded, often point the way to improvements. In the end it is not laboratory life test reports but the customer's opinion that really matters, and it is all the more surprising how many customers just don't know.

We may be approaching the time when the average life of an installation is regarded as the period before the failure of the first lamp, or perhaps the first two or five per cent. of lamps installed. In large shoplighting installations the first failure is conspicuous and suggests badly maintained lighting. Even in industrial installations a few per cent. of failures coupled with general reduction of light output may together justify bulk replacement even when balanced against cleaning schedule and labour costs.

Such drastic treatment obviously calls for a product of great uniformity with complete absence of early failure, and it is to this end that the lamp manufacturers are working. It is not generally realised that the life uniformity of fluorescent tubes—at least of some makers—is now rivalling that of incandescent lamps and may well surpass it.

One aspect of such a study might well be that of the desirable life for a particular application rather than a slavish assumption that 1,000 hours is good for all incandescent lamps and 5,000 for fluorescent tubes. We all know many instances where lives different from the nominal are desirable and indeed obtained, as for instance over-run incandescent lamps for sports lighting and under-run lamps for radiant heating. Incidentally it is one of the curiosities of lamp economics that as regards general lighting a life around 1,000 hours for incandescent lamps has consistently remained the most economic one to the user despite quite large changes in the price of lamps and electricity.

### Street Lighting

Road safety has inevitably been in the limelight again this year and was the main theme of the A.P.L.E. conference at Eastbourne. Looking back on the papers and discussions, perhaps the most significant feature that emerged related to night-time pedestrian deaths which, between 1952 and 1953, increased by 24 per cent. as compared with a 1 per cent. increase in pedestrian deaths by day. Most of the fatalities occur near pedestrian crossings, road junctions and intersections, and two particular lighting requirements appear to be essential. In the first place, the flashing beacon cannot be regarded as a substitute for good street lighting, and in the vicinity of pedestrian crossings good lighting is a prime requirement. Secondly, the danger areas near road junctions and crossroads urgently need attention, and I remember Mr. Durbridge's reference at the I.E.S. summer meeting to his treatment of such black spots in the Borough of Harrow. On roads where general improvement of street lighting is at present financially impractical, the junctions and intersections are lit with sodium lanterns up to full Group A road standard, and from my own experience I would say that this is an admirable expedient.

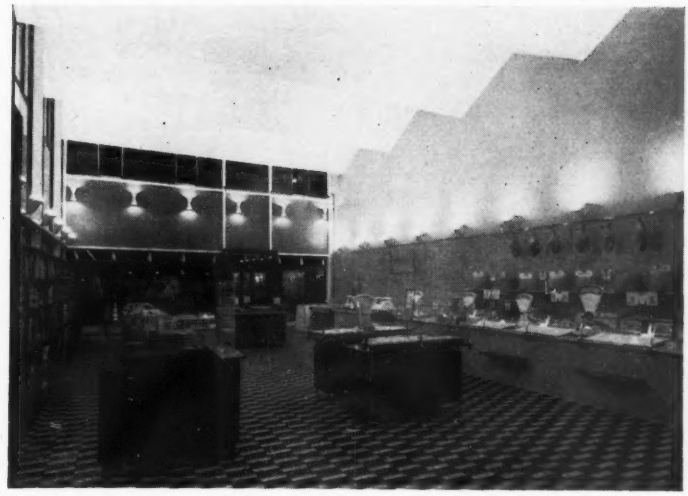
This emphasis lighting of intersections is also to be found on otherwise unlit by-pass roads, and there is perhaps a good case for the use of cut-off lanterns at such sites. Having driven for some miles along unlit roads, the absence of glare is especially desirable at the danger point, and a glare-free installation will make the return to the darkened section of the road a much less risky procedure.

Various other aspects of this road safety problem come to mind, not the least of which is the siting and illumination of road signs and indication boards. Under present conditions the driver-cum-navigator is often a menace to all road users and himself, with his attention devoted more to direction finding than to the hazards of his route. In this connection the new ring route indication boards appearing in London should be most helpful.

Reflective signs for use beside unlit roads are also becoming widely used and are highly effective either by night or day. The reflecting surface consists of minute glass beads sprayed on to the face of the sign and bonded with clear lacquer. The illustration shows a convincing comparison between the appearance of a stove enamelled, a reflective and a vitreous enamelled sign when viewed at night as they would be seen by the light of a car headlamp.

Much interesting data has come from the Road Research Laboratory this year. The studies of road reflection characteristics and the relation of lantern distribution to type of road surface are well worth noting. The popular non-skid surface is, of course, irregular in its detailed contour—as opposed to the "patent leather" surface of a worn tarred block road—and has a large number of near vertical faces reflecting light away from the observer. This has the effect of shortening the tail of the perspective brightness pattern on the road, and it is suggested that medium-angle lanterns should be used in preference to those having a high-angle peak distribution with such surfaces. This is, of course, very much in line with the ideas of modern fittings designers, who have for many years been trying to wean street lighting authorities from the economy of extreme high-angle lighting. But, as always, public willingness to spend money is a tree of slow growth. I suspect that, 30 years ago, modern standards of street lighting would have been regarded as quite unnecessary extravagance. I sometimes drive through pre-war installations which have been properly maintained and which in their day were considered quite satisfactory. But today the installations seem quite inadequate in every respect. Part of this changed attitude is, of course, due to more stringent requirements for visibility because of the greater number of cars and their greater powers of acceleration, but a lot is surely a result of the growth of public interest in road safety.

The introduction of the 400-watt MBF mercury fluorescent lamp has created interesting possibilities in street lighting. It offers an easy way to better colour rendering for those who already have the ordinary 400-watt MA mercury lamps, as it operates from the same



*David Greig. Canterbury—an interesting indirect lighting installation.* (*Philips photo.*)


*A lumenated ceiling in a grocery shop.* (*Lumenated Ceilings, Ltd., photo.*)

*"The Blind Beggar" Mile End Road—a pleasing example of modern lighting in a public house.* (*G.E.C. photo.*)

control gear and will, it is thought, fit into almost all lanterns which have been designed for the MA lamp. The new lamp may also be attractive to those who want reasonably good colour rendering but wish to avoid the rather high initial cost of a fluorescent tube installation. How the use of the new lamps will affect the light distribution from lanterns has yet to be determined, but many changes are likely to be for the better.

The increase in tubular fluorescent street lighting has continued, and there seems to be little doubt that this increase will persist in years to come. Notable installations are to be found in Holborn, where the Borough Council has authorised the fluorescent lighting of the network of main thoroughfares, and in Aberdeen, where a large number of wall-mounted cold cathode fluorescent fittings have been most skilfully installed.

Holophane have introduced a rather unusual design of lantern to meet the fashion for wall mounting. It looks rather like a large bulkhead fitting and provides a non-axial asymmetric light distribution suitable for lighting narrow streets.

The G.E.C. has marketed an interesting new type of concrete column which has all the advantages of pre-stressed construction and has in addition some unstressed reinforcement which ensures that it remains safe in case of accident.

The Road Research Technical Paper No. 32, Vehicle Headlighting: Visibility and Glare, reminds us that much could be done to improve the performance and aim of a large proportion of headlamps in use at present but realistically points out that "only a very limited and variable standard of vision is possible unless there is a radical departure from the present type of lighting."

The colour of headlamp beams has also been studied and some interesting details emerge. Although the use of the cadmium bulb is compulsory in France, there are also regulations enforcing the use of meeting beams with a more sharply defined upper limit and lower glare intensities. As Mr. V. J. Jehu, of the Road Research Laboratory, points out in his article in *Light and Lighting*, October, 1954, this fact alone should make "the French meeting beams appear less bright than their British counterparts, quite apart from the question of the colour of the light." Although not yet a convert to cadmium bulbs I must say how much I appreciate the original work of Major Graves in developing the headlamp bulb with a metal cup round the passing beam filament to provide a sharp cut-off close to the horizontal. What a pity that this British development was never pursued effectively. Indeed there must be many motorists who today think that hooded filaments are a Continental development—an illusion fostered by the use of the European name "duplo."

Europe is not the only place where these bulbs are used; in U.S.A. sealed beam lamps with hooded filaments are being found a considerable improvement over the conventional design. Which reminds me of the pleasure of being driven in an American car with photocell actuated dipping. Quite apart from the advantage of such a device to the opposing traffic, automatic dipping is so much more reliable than manual operation—and so much quicker in returning to normal as soon as the other car has passed. This moment immediately after passing an oncoming car is always a potentially dangerous one.

Let us face it, night driving is too difficult for all but the superman (or woman !). With traffic density and street lighting as they are in most of the towns and cities of this country, to drive absolutely safely and always within the limits of one's vision is a practical impossibility.

The time has surely come when motoring should be subject to the equivalent of Factory Acts wherein every effort is made to create a situation in which accidents are prevented. If the State thinks it necessary to enact legislation requiring that all factories have lighting adequate enough to prevent accidents it should enact similar legislation on the roads. And what applies to lighting applies for all other accident-preventing equipment.

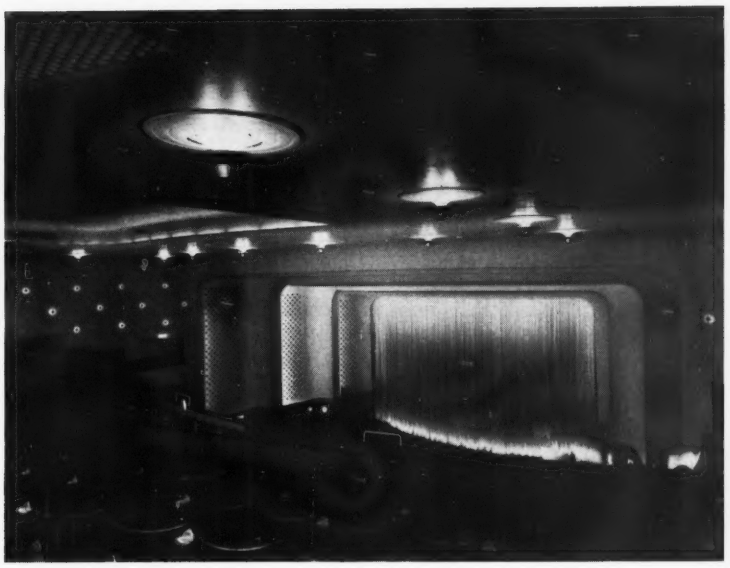
### Industrial Lighting

The most significant newcomer to the heavy industries is, I think, the fluorescent tube, and there is now ample evidence that it can be used to good effect as much in high-bay as in low-bay installations. This does not necessarily mean that in the final analysis it will prove to be superior to any other light source, but its progress to date certainly merits some careful thought. The fluorescent tube's incursion into this field of lighting may well be due to its remarkable improvements in efficiency and life during the last few years; it is now so much improved that it must be considered for all kinds of installation, but time alone will tell the true story of its suitability for heavy industry.

Meanwhile, two interesting installations come to mind—the 1,800 8-ft. 125-watt Metrovick Natural tubes in the Ferranti transformer factory, and the 748 5-ft. 80-watt Atlas White (3,500 deg. K.) tubes in Rye House generating station. The mounting heights and illumination levels on the working plane are 64 ft. and 15 ft.c. and 40 ft. and 20 ft.c. respectively. The claimed advantages of this type of installation, compared with plain mercury or blended lamps, are good colour-rendering properties, greater uniformity of illumination with less masking by travelling cranes, and acceptable economics. On the debit side, however, any such scheme with a plurality of lighting units must introduce greatly increased maintenance charges, especially in dirty atmospheres, and the possibility of higher servicing costs. Though basically reliable, the failure of control gear is still a contingency to be faced.

The lighting of high bays (a term no longer synonymous with heavy industry) is probably the most controversial aspect of the subject, and I sometimes wonder whether colour or cost will eventually prove to be the deciding factor in the choice of installation. Purely on economic grounds the 1,000-watt MB lamp is undoubtedly, as Mr. F. Jones said at Southport, the best proposition. By present-day standards it might be regarded as being suitable only for the lighting of steelworks and foundries, but in fact it is used with equal satisfaction in aircraft factories and hangars and for supervisory lighting in generating station turbine rooms. And so, in precisely similar applications we hear of the use of plain mercury, mixed mercury and tungsten, or fluorescent lamps, all apparently depending on their own particular justification—be it on the score of economics, maintenance, uniformity or colour.

The papers on industrial lighting at the Summer Meeting were of great interest, in that they showed that one factor was in each case responsible for the selection of the type of lamp employed. But no one who listened



*The Regal Cinema, Aberdeen—a good example of modern cinema lighting.*
*(Thorn Elec. Industries photo.)*

to the four papers could have come away persuaded that for any of the installations mentioned there was one and only one solution to the lighting problem.

Last year I commented on the increasing demand for better colour rendering in industry, and when a complete range of mercury fluorescent lamps, up to 1,000-watt rating, is available we shall be able to judge this requirement in its true perspective. Except for the most exacting applications the mercury fluorescent lamp may well become a standard of reference for industrial lighting.

One point of detail in fluorescent fittings is the design of lampholder. The floating cord-grip holder for the 5-ft. tube, even though cheap and satisfactory, is untidy, and it has been a source of personal exasperation to me for a very long time—so I welcome the increasing use of various types of push-in holder for bayonet caps. There appear to be two types—one in which the cap contacts are retained above knuckle-shaped springs, and the other of retractable form designed to accommodate the variations in tube length and employing the bayonet action for holding the cap in position. In both cases the lamp is entirely supported by the holders, and the ever-tiresome Terry clip may well be on its way out. For bi-pin caps we also have a retractable holder and, whilst sacrificing the previously short overall length of cap and holder it provides (dare I say it?) the first satisfactory mounting for this type of cap. As with other aspects of the lighting industry—the "tungsten matching" colour of fluorescent tubes and cut-glass chandeliers, for instance—it seems we are back where we started, and one is tempted to bemoan the original departure from the bayonet cap.

In addition to flameproof fittings for use in hazardous atmospheres I note the interesting development of pressure-protected lighting installations, designed for use in situations for which there are at present no officially certified flameproof fittings. In particular, acetylene, carbon disulphide and hydrogen gas have hitherto presented great problems, and one has only to consider the increasing use of hydrogen-cooled generators as a typical instance to appreciate the significance of this lighting technique. An excess pressure of air, or occasionally an inert gas such as carbon dioxide, is maintained within the fittings and conduit to prevent the entry of explosive gas, and a pressure-sensitive relay is incorporated to isolate the system should the pressure drop below a critical value. Pressure is either maintained throughout an entirely sealed system, or alternatively a slow air flow is permitted from each fitting by the use of a compressor drawing clean air from beyond the danger area.

An interesting new fitting for industrial lighting has been marketed by The Engineering and Lighting Equipment Co., Ltd. The fitting is of "Perspex," with a die-cast aluminium gallery, and sizes are available for 100- to 500-watt filament lamps. The globe is in two parts, reflector and diffusing cover, and there is a choice of several types of "Perspex" according to the amount of upward lighting required. For example, the fittings in the illustration have grade 028 for the reflectors and Pinspot Patterned for the diffusing covers. Each houses a 300-watt lamp, and there is remarkably little glare. One of the features of these fittings is the hollow gallery in which the convection current from the lamp dissipates its heat and allows the use of a smaller globe than might be expected: the diameter to take a 300-watt lamp is only 18 in.

I note the introduction of the "New Range" of fluorescent fittings by Crompton Parkinson, and particularly their welcome use of retractable B.C. lampholders. The possible assembly of 54 different fittings from about a dozen components is an example of the benefits of standardisation.

### Shop Lighting

Next to homes, small shops are probably the most neglected class of premises where lighting is concerned. The skill and experience of the lighting engineer seldom seems to penetrate to the small shops, and one wonders whether this is because the makers of lighting equipment do not consider such small jobs worthy of their engineers' attention—or perhaps the shopkeepers themselves are shy of asking a large firm for advice. There are, however, the Lighting Service Bureaux in London and the

provinces where individuals or trade associations can obtain really sound advice, and free of charge, too. The L.S.B. in London has this year produced the third of its most excellent handbooks on illuminating engineering, which deals with shop lighting. It is packed with good advice and will, I hope, be widely used.

The excellent paper read by Mr. Olson and Mr. Veness during the E.C.A. Conference at Harrogate probably provides the most complete answer to the problem of improving the standard of lighting in small shops. They pointed out the size of the problem in that there are over 300,000 "small men" in this country—retailers with an annual turnover of less than £10,000—and suggested that contact with such potential customers was primarily the responsibility of local contractors. But how to educate the contractors?

The large-scale shop lighting installations are often planned by the lighting engineer in collaboration with the architect and fittings designer, but it is easy to imagine the local tobacconist's apprehension on being approached by a "Registered Lighting Engineer" with suggestions for relighting his shop. Far better, surely, for the local (enlightened) contractor, who has already installed his television set and put that power point in his kitchen to go to the tobacconist with a friendly suggestion for improving his shop lighting now, with some carefully chosen fittings at relatively low cost. I feel that much could be done by the lighting industry as a whole to help the contractor to help his customer by the preparation of more publicity aids, booklets on the basic techniques of good lighting and articles in trade journals. (This, of course, is a recurrent theme of mine.)

There is already clear evidence that the small man is anxious to keep up to date by the use of a fluorescent tube somewhere in his premises. But so often it is mounted vertically, naked and unashamed, in one corner of his window, providing intolerable glare for the passers-by and giving no emphasis at all to his display.

An interesting development in shop lighting fitting design is the new range of blended fittings introduced by Courtney Pope (Electrical) Ltd. The combined use of fluorescent tubes and filament lamps, operating independently in the one louvred fitting, results largely from the introduction of the New Warm White tube, the colour appearance of which blends acceptably with tungsten lamps. With roughly equal power loading of both types of lamp—say, two 5-ft. tubes and three 60-watt lamps—an overall efficiency of about 30 lumens per watt is obtainable.

With ever-rising labour costs the larger stores are coming to realise that lighting, properly applied, is an economic alternative to their sales staff, and such terms as "self-selection" and "self-service" imply the use of specialised lighting techniques for display and selling purposes. The Landport Drapery Bazaar at Portsmouth typifies a modern self-selection store where local lighting is widely used to induce the customers' selection without the aid of an assistant.

I commented last year on the unfavourable economic aspects of the reflector spotlight lamps. Since that time anodised aluminium clip-on reflectors have been marketed to convert the 150-watt general lighting service lamp into a reflector type, albeit with a slight reduction in efficiency. With a list price of the same order as that of the spotlight lamp, it is evident that the non-expendable reflector will prove most popular where lamp replacement costs are taken seriously. This is, of course, an unfortunate state of affairs for the lamp makers—the reflector spotlights held great promise when they were introduced and the 75-watt rating especially could have proved a most popular new introduction into home lighting. The great attraction of such lamps is that they are a small, unobtrusive source of directional light, and I hope it is not too late to stage a real boost for these lamps.

The lighting of grocery and provision shops with fluorescent tubes frequently calls for very careful selection of tube colours and at times the use of supplementary tungsten lighting is also necessary from considerations of emphasis and brightness as well as colour. I need not elaborate on this particular point, but there is another facet of the problem which I feel to be of general interest in that it shows how easily colour complaints can be associated with fluorescent lighting.

Perhaps the most difficult class of foodstuffs to light are bacon, ham and cooked or processed meats, and I learned recently with interest that not only lighting, but also the conditions of storage are responsible for both apparent and actual colour change. The refrigerated glass-enclosed type of counter unit, which is becoming widely used, is often equipped with fluorescent tubes for display lighting. In the course of some carefully observed tests it was found that, apart from the inevitable distortion of colour rendering (red meat tints and near-white fat colours seem to have irreconcilable requirements for satisfactory lighting), the foodstuff dyes employed were also temperature fugitive. The appearance of cooked meats stored for a time at low temperature in counter units was appreciably altered; fluorescent lighting was not entirely to blame for the meats' apparent unpalatability.

The Canterbury branch of David Greig, Ltd., shows a most pleasing example of contemporary tungsten lighting in a food shop. It could be said that a lighting installation does not need to be fluorescent to be modern. As can be seen from the illustration, it is basically an indirect lighting installation which emphasises the interesting crimped ceiling—the 500-watt reflector spotlights providing 35 ft.c. at counter level. Local lighting, with pattern piercing of some of the fittings, adds sparkle and the whole scheme is brought to life by an imaginative colour decor of a red end wall, yellow top side wall and pale green tiles. The ever-welcome co-operation between architect and lighting engineer is plainly in evidence here.

We are likely to see a great extension to the use, and variety, of "illuminated ceilings" as a comfortable means of providing much increased levels of illumination on the working (or selling) plane. Perhaps we have reached the turning point away from the forest of fittings (pardon the platitude) hanging from the ceiling of every store.

The luminous ceiling, popular for some time in America, is now appearing in this country and Lumenated Ceilings, Ltd., have carried out some effective installations, one of which can be seen in the illustration. The false ceiling consists of a light suspended metal framework which supports lengths of corrugated plastic sheeting. This diffusing sheeting, weighing less than 1 oz. per sq. ft., is easily rolled back when cleaning or access to the lighting fittings is necessary. As with most lighting matters, a photograph rarely conveys the full

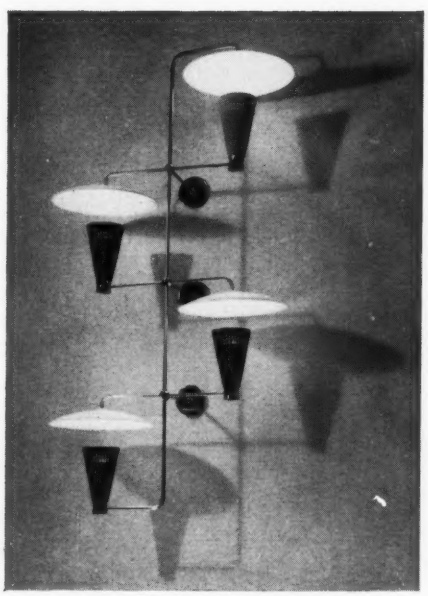

*The Coca-Cola sign in Piccadilly Circus.*
*(Claudgen photo.)*

effect of the installation and it is true to say that the lumenated ceiling has to be seen to be appreciated.

I have some misgivings about classing a public-house as a shop, but the case of The Blind Beggar, in the Mile End Road, illustrates the salesmanship of good lighting. This public-house was recently relighted and redecorated in modern style, as will be seen in the photograph, and the landlord reports that his trade has increased very considerably as a result. A coloured photograph is really needed to convey an impression of the warm, comfortable and interesting atmosphere which has been achieved. (Well done, Mann, Crossman and Paulin.)

Here I must pause to comment on the terrible lighting which still exists in so many of our public-houses. Some


*"Perspex" enclosed cold cathode sign.*
*(Claudgen photo.)*



*Mr. Barnicott's latest prize-winner.*
*(Falk, Stadelmann photo.)*

have hardly got beyond the bare bulb stage. I am sure glare ruins the taste of beer, so please could we have more effort from the brewers.

**Home Lighting**

Another year has passed and as far as I can see we have made no real progress towards the introduction of fluorescent lighting into the home or even achieving a decent standard of illumination with tungsten lamps. Why is this? The lamp and fittings manufacturer has no direct contact with the domestic market and, as in the case of the small shopkeeper, must rely on Area Electricity Boards and contractors to make the essential contact.

Much the same, however, could be said of the television industry, and yet because this market is essentially domestic a highly specialised sales and service organisation now exists in practically every radio shop in the country. The radio industry took it upon itself to run training courses in television installation and maintenance and is reaping a rich reward; with 12,000,000 homes in this country the lighting industry must surely have some scope as well?

I do not accept the suggestion that cost is the chief deterrent to the introduction of domestic fluorescent lighting, as expensive luxury in the form of TV, washing

machine and refrigerator is an accepted part of our life today. Surely visual comfort and the care of one's eyesight has a right to some priority when the family budget is worked out. In my view, the fluorescent tube must be regarded as the complement to tungsten lighting, and in living rooms can be installed behind a pelmet or above a simple cornice with delightful results. Expensive fittings are not required for indirect lighting and such a scheme can be carried out for a few pounds.

The Deluxe Warm White tube is suitable for domestic lighting and, with a proper approach to the problem, could do much to overcome the prejudice against the colour and colour rendering of fluorescent lighting. The householder is competent to plan his colour schemes in decoration or furnishing but I think it is too early to offer a choice of lamp colours. First let us establish the "tungsten-matching" fluorescent tube in the home —the more exotic considerations of colour choice can follow later.

Instant-start gear is most desirable for domestic installations. The ballast lamp circuit offers a considerable economy in capital outlay but at the cost of lamp life and reduced overall efficiency.

It is interesting to note that fluorescent fittings for home use in America are sold in a somewhat similar manner to ordinary floor standards. The fittings are equipped with leads and plugs for immediate connection to the standard sockets and have keyways which make it extremely easy to hang them on the wall, which is usually of wood. Such practice might not be so popular in this country with its brick walls and scarcity of electric supply points but our "handymen" are becoming "handier" every day and few are now shy of Rawlplugs.

### Miscellaneous

The lighting of London's reconstructed Guildhall cannot pass without comment, and our frontispiece shows this notable installation in use. The fittings were designed by the architect, Sir Giles Gilbert Scott, to be in keeping with the Gothic style of the building; each is 8 ft. 3 in. high and weighs about half a ton. The metalwork is in bronze and filament lamps are used as the light sources.

After-dark sport is becoming steadily more popular in this country, but we are far behind some other countries. Sydney, for example, has something like 1,200 artificially lighted tennis courts, some public and some club; the number of lighted courts in the whole of this country is insignificant compared with this. If we are to be in the forefront of world sport we must, I think, take note of trends like this, and I am glad to see that more and more football grounds are being lighted for evening play. Two systems of lighting football fields are struggling for popularity; one using four, six, or eight high towers, each with a battery of floodlights, the other using rows of fittings mounted much lower, on the canopies of the stands.

The use of artificial lighting in connection with plant growing and animal husbandry is still on the increase. For example, in winter, when the hours of daylight are short, fluorescent lighting is being used to extend the chickens' day, and by thus persuading the birds that it must be spring a higher rate of egg production is maintained. A detail which tickles my fancy is the provision of a few minutes of twilight in an artificially lighted poultry house to allow the chickens to find their way to bed before all the lights are switched off. This twilight is sometimes provided by dimming the main lighting, but it has been found that a few low-wattage filament lamps can eliminate the need for dimming equipment.

Reports have been coming from overseas that the use of ultra-violet radiation in animal houses can reduce disease and increase production. This is obviously of the greatest interest to this over-populated island of ours and experiments are being carried out which, if results are good, may lead to the widespread use of germicidal tubes and "sun ray" fluorescent tubes. Temperature requirements in animal houses often make really adequate ventilation impracticable and the 2,537 A.U. ultra-violet radiation from germicidal tubes is used to keep down the germ content of the air. The longer wave-length ultra-violet radiation (around 3,000 A.U.) from the "sun ray" tubes is used to promote the production of Vitamin D within the animal's body.

I am sorry to note that the Medical Research Council has been so discouraged by the results of their experiments with germicidal tubes in schools. One wonders whether the tests would have been more conclusive if germicidal tubes had been used not only in the schools but also in all other places in the area, such as cinemas, clinics, Sunday schools and so on, where the children congregate. Perhaps some day we shall see another attempt made, if and when these tubes become well established in the pig and poultry houses.

I wish I could comment with some authority on the floodlighting and decorations which were staged in Australia and New Zealand for the Royal Tour. From all reports it must have been a very good show.

I am glad to see that, in comparison with the United States, we still exercise some restraint in luminous advertising. The new Coca-Cola sign in Piccadilly Circus is probably about the limit of what is possible with cold cathode discharge tubing and a very fine effort it is. If, however, greater obtrusiveness is necessary a mass of filament lamps may be used, the power of which may be raised until the output per square foot far exceeds that which can be achieved with discharge tubing.

The move away from bare sign tubing to "Perspex" enclosed tubing is, I think, a welcome step as it improves the daytime appearance of the sign.

### Conclusion

I remarked at the beginning about some of the difficulties of repeated Random Reviews and as the end of this one comes in sight I find myself back on the same theme, conscious moreover that experience teaches one the dangers of trying to be bright and interesting as well as factual.

To quote an old saying, truth has many sides. One learns how difficult it is even to portray the facts in a fair light, but the expression of personal opinions as well is almost certain to give rise to righteous indignation and an expanded correspondence column in the next issue of *Light and Lighting*. Consequently the satisfaction I now feel at having finished this article in time for the January issue is tempered with some foreboding about the February issue, in no way eased by the knowledge that apologies in advance are never as disarming as they ought to be!

# Lighting Abstracts

## OPTICS AND PHOTOMETRY

612.843.31

**118. Preliminary survey of colour preferences in television pictures.**

M. GILBERT. *Trans Illum. Eng. Soc.* (*London*), **19**, 225-234 (*No.* 8, 1954).

Describes an investigation carried out in order to determine some of the colour-rendering characteristics that a viewer of colour television would consider to be satisfactory. It is concluded that the colours of a reproduced scene need to be less saturated than the colours of the original scene being televised. This is in line with findings on colour film reproductions. There is evidence to show that it may also be desirable to make the reproduced colours rather more blue than those of the original scene. Although it is important that the home viewer should not have to deal with too many controls it is suggested that a knob to adjust the red-green ratio of a colour picture may be desirable.

W. R.

## LAMPS AND FITTINGS

621.327.43

**119. New types of discharge lamps for lighting purposes and new control gear.**

F. ZIEGLER. *Elektro-post*, **7**, 474-478 (*Sept.* 27, 1954). *In German.*

Describes the various circuits recently developed for the starter-less control of fluorescent lamps, with particular reference to the use of a resonance circuit. The new TL-M lamp has a starting strip connected to one electrode through a high value resistor built into the lamp at the socket. The author goes on to describe the latest fluorescent lamps and gives block diagrams for these. He also gives spectral distribution curves of energy and light for the new mercury lamps with fluorescent coated "egg-shaped" bulbs.

J. W. T. W.

621.327.4

**120. Radio interference from discharge lamps.**

H. STEINBACH. *Elektro-post*, **7**, 479-482 (*September*, 27, 1954). *In German.*

Discusses the possible sources of radio interference in a discharge lamp circuit with particular reference to radiation from the lamp itself. High pressure lamps and sodium lamps seldom give trouble, but low voltage, low pressure fluorescent and similar lamps with pre-heated electrodes are likely to cause interference, especially at starting. The interference is greater in the short-wave and ultra-short-wave regions. Circuits for reducing interference are described; these depend on the use of combinations of small condensers of 10,000 pF (0.01 $\mu$F) capacity. In special circumstances, screening of the lamp itself, as well as shielding of all leads, may be necessary. J. W. T. W.

## LIGHTING

628.92

**121. Daytime lighting of school classrooms.**

R. A. BOYD AND T. D. WAKEFIELD. *Illum. Engng.*, **49**, 388-391 (*August*, 1954).

A full-scale classroom has been used for measurements of illumination and luminance at selected indoor positions made simultaneously with records of the outdoor illumination. Supplementary artificial lighting was automatically switched on in two stages when the illumination at the indoor control position fell below 30 lm./ft.$^2$. The first stage was found to be required for about 23 per cent. of the school year and the second stage for about 15 per cent. of this time. P. P.

628.93

**122. New experimental studies on the lighting of rectangular interiors with diffusing walls.**

J. WETZEL, E. BARTHES AND MME M. BEZINE. *Bull. Soc. Franç. Elect.*, 7th Series, **4**, 469-478 (*August*, 1954). *In French.*

An experimental study using models, of the influence of reflection factors of interior surfaces and of proportions of the interior upon the utilization coefficient. Illumination was measured in a model which could be divided into three compartments, in which the reflection factors of walls and ceiling could be varied, and which was lighted by an arrangement of small enamelled and frosted lamps. A photocell was used, and corrections arising from errors in cosine response are calculated in some detail. It is concluded that the harmonic mean formula for the room index is substantiated, for the range of values covered by the experiments. J. M. W.

628.93

**123. Lighting from large areas.**

F. STAUFFERT. *Lichttechnik*, **6**, 320-322 (*September*, 1954). *In German.*

Describes the results of experiments on model louvred ceilings of various materials, transparent and diffusing, plastic and glass, and with various angles of cut-off. Figures are given for the efficiency, the average luminance and the ratio of minimum to maximum luminance. A series of polar curves shows the light distribution in different planes from ceilings of different kinds. J. W. T. W.

628.972

**124. Luminance and colour as factors in assessing the quality of a lighting scheme.**

A. WALD. *Elektro-post*, **7**, 467-470 (*September* 27, 1954). *In German.*

Describes experiments carried out in a model office to determine the quality assessments made by 35 observers on five different types of lighting, four fluorescent and one tungsten, when the illumination on the desk had any one of the four values 2.5, 5, 10 or 20 lm/ft$^2$. Practically all observers considered 2.5 too low, but at 5 lm/ft$^2$ some 30 per cent. considered it adequate in the case of tungsten. At the higher values there was not much preference for one colour over another. In a second experiment the observers were asked to express a preference between tungsten and each of the four fluorescents in turn, again at the four values of illumination. The preference for fluorescent was more pronounced at the higher values and in the case of the warmer colour. A similar experiment, in which the colours of objects was a matter of interest, gave very different results and it is concluded that the nature of the work done greatly affects the choice of illuminant. J. W. T. W.

628.97

**125. Artificial lighting for plant growth.**

A. E. CANHAM. *Trans. Illum. Eng. Soc.* (*London*), **19**, 235-261, (*No.* 8, 1954).

Discusses the effect of artificial light on plant growth and development and describes recent research work. The present available information on the effects of colour and light energy is reviewed and the characteristics of various light sources and methods of installation are discussed. There are sections on light in relation to the flowering of plants, bulb forcing and miscellaneous applications. W. R.

*Fig. 1. General view of the main portion of the Autoroute de l'Ouest before the lighting was installed.*

# Lighting of the Autoroute de l'Ouest

By M. de BUFFEVENT*

*Fig. 2. The line of columns on the central reservation.*

The purpose of the Autoroute de l'Ouest, the first of the French autoroutes to be constructed so far, is to allow traffic leaving Paris for the west to get clear of the immediate suburbs without difficulty and to get as quickly as possible to the main routes leading to Normandy, Brittany and the south-west which lie on the far side of Versailles and St. Germain.

The autoroute is approximately 30 km. (about 19 miles) long and in plan is in the shape of a Y; the main portion consists of two separate nine metre (30 ft.) wide carriageways; the two branches after the road divides each have two seven metre (23 ft.) wide carriageways. The volume of traffic is steadily increasing and is already comparable with that on the major roads in Paris itself; the average over the year at the St. Cloud tunnel is now more than 27,000 vehicles a day and at times is as much as 60,000 vehicles a day or 5,200 vehicles an hour. A large part of the traffic, about 26.5 per cent., is at night. Every Sunday during the summer months more than 10,000 vehicles pass through the St. Cloud tunnel between nine in the evening and seven the following morning. The peak periods of

* Chief Engineer, Roads and Bridges Department of Seine-et-Oise.

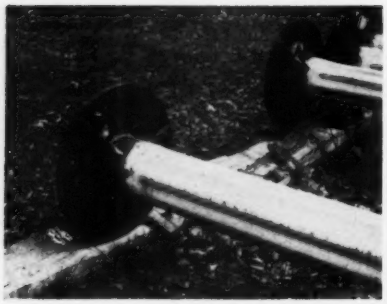


*Fig. 3. The lower end of the column showing the reinforced flange for fixing to the concrete base.*

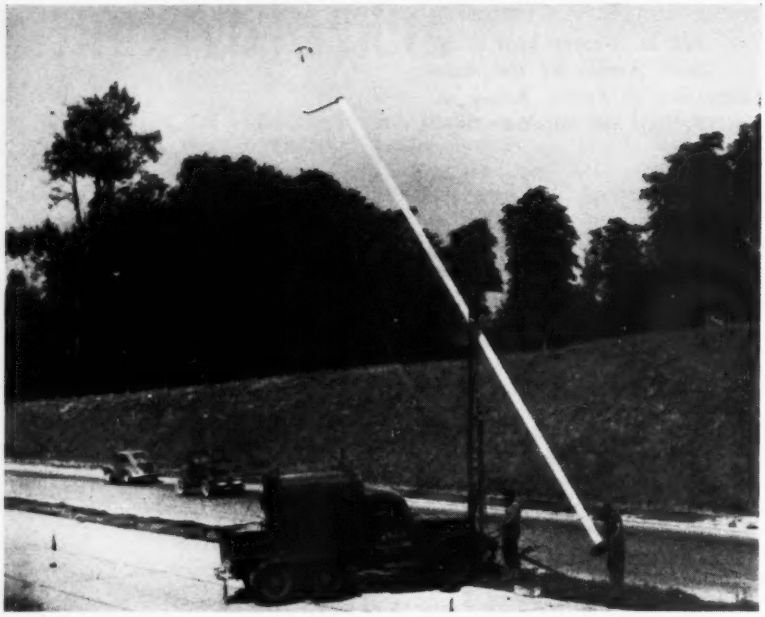


*Fig. 4. A column being raised into position. The simplicity of the operation will be noted. The columns required for lighting the first section of the main highway, after they had been deposited at their respective positions, were erected and fixed at the rate of 15 per day.*

traffic density occur in general after dark when, without lighting, the police are unable to maintain effective control.

In 1953 61.5 per cent. of accidents not involving personal injury and 40.5 per cent. of those which did occurred at night so that on the basis of an equal volume of traffic there were twice as many accidents by night as there were by day. Therefore the Administration des Travaux Publics, which so far has shown great reluctance to undertake the lighting of the routes nationales where they run in open country, decided that it must make an exception in this case. The first section of lighting, between the St. Cloud tunnel and the road junction at Vaucresson, was completed at the end of 1953. In 1954 it is being extended as far as the Triangle de Rocquencourt where the two branches of the road diverge.

### Details of the Lighting Installation

In planning the lighting installation stress was laid, because of the speed of traffic, on the need for a high standard of lighting with a good distribution both as regards illumination and brightness. It was also necessary to ensure that there was sufficient light at the sides of the road to enable motorists having mechanical trouble to get going again and to render visible stationary vehicles which on such roads are always a potential danger. Owing to the general layout of the road, with its long straight stretches and sweeping curves of long radius, great care also had to be taken to avoid glare from the long line of lanterns which can be so troublesome with axial lighting.

From the point of view of safety it was necessary to reduce to a minimum the risk of sudden and unexpected

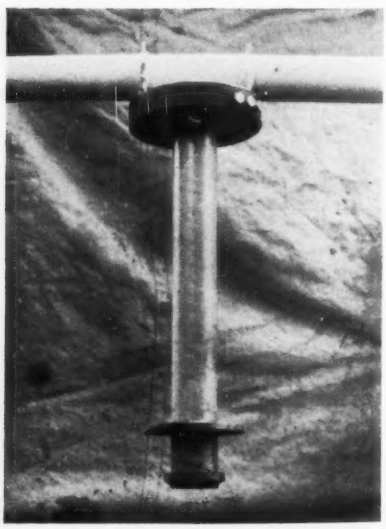


*Fig. 5. Showing the system of fixing the double-arm bracket. The vertical part fits inside the column and the side bolts, engaging in the flutes of the shaft, prevent any rotation. The lower flange is secured similarly so as to prevent any vertical movement.*

*Fig. 6. Bracket arm and lanterns in position. The arm, the axes of the two lanterns and the axis of the column are in the same vertical plane which is normal to the axis of the Autoroute.*

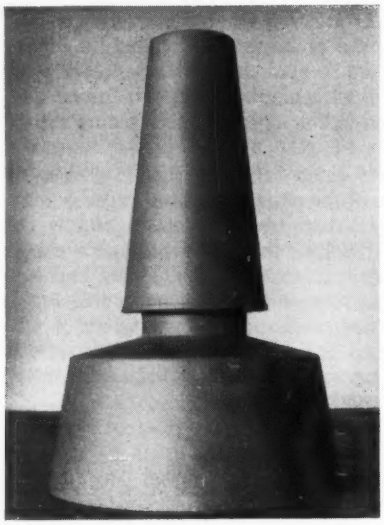
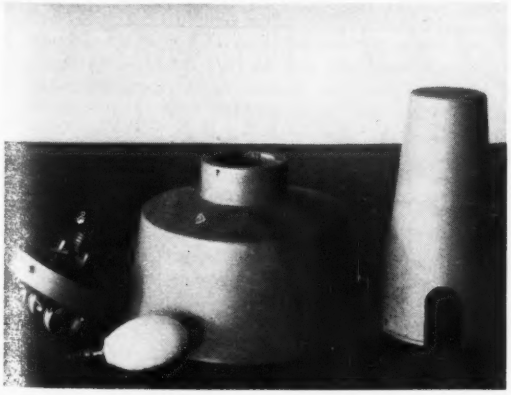


*Fig. 7. A lantern.*

*Fig. 8. The component parts of a lantern. From left to right:—The cover to which are attached the saddles for fixing to the bracket arm, the supply elements, the holder for the lamps and the means for adjusting the height of the lamp; the HPL lamp; the lower part of the body inside which are mounted the reflectors; the upper part of the body, cut away at the bottom to admit the bracket arm.*



extinction which, if it occurred at a time of high traffic density, might lead to serious accidents.

Finally the aesthetic point of view could not be ignored. The autoroute traverses a well-known stretch of country and everything which concerns it is always a matter of public comment. It was necessary, therefore, to avoid any kind of disfigurement and to ensure that the highway preserved its character of a country road.

In view of the relatively novel character of the problem, numerous full-scale trials as to the type, the arrangement and the spacing of the columns, the height of the fittings and their number, etc., were made before definitely deciding on the details of the installation described in what follows.

### Characteristics of the System as Installed

The columns are erected on the central reservation at a spacing of 50 metres (about 165 ft.); each column carries two lanterns 90 cm. on either side of the centre line and at a height of 13 metres (about 43 ft.) above the ground. (Fig. 2). The lamps used are Philips HPL 250-watt mercury vapour lamps.

The columns are made of plain steel tube 5 mm. thick and of fluted octagonal section. The exterior diameter is 13.8 cm. (about 5½ in.) and they are 12.30 metres long with a flanged foot by which they are secured to a concrete base. (Figs. 3 and 4). The double arm brackets are of 6 cm. diameter steel tube. The shape of the brackets was determined entirely by the appearance and so was the shape of the lanterns. (Figs. 5, 6 and 7).

The optical system of the lanterns consists of two adjustable mirrors of electrochemically polished refined aluminium. Each mirror is made up of a series of conical sections which give a high maximum intensity along the axis and cylindrical sections giving images of the source which increase the reflected light at a short distance from the lantern (Fig. 9). The reflectors can be adjusted

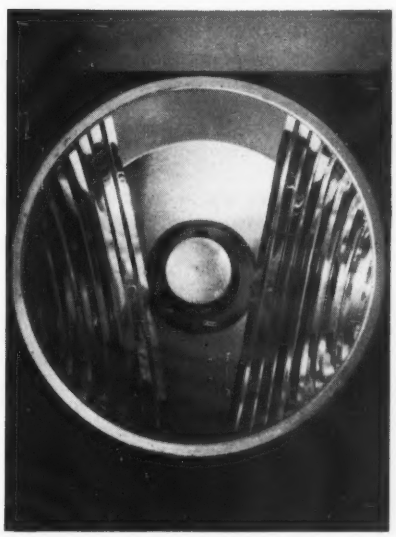


*Fig. 9. View of the lantern from beneath showing the two reflectors.*

*Fig.* 10. *The Autoroute at night.*

both horizontally and vertically; this allows the direction of the beam from the lantern to be altered without disturbing the lantern itself. The lamp is mounted slightly above the axis of the reflectors so that the main beam is at about 65 deg. from the downward vertical.

### Electricity Supply

Each lamp is supplied from the secondary of a separate small transformer situated at the base of the column and designed so as to avoid any need for the usual auxiliary stabilising apparatus.

The supply cables, run along the central reservation, are so arranged as to provide two distinct pairs of feeders to which the columns are connected in alternate pairs.

The lamps are run on a constant current series system. This system has, in the present case, enabled an overall saving of 8 per cent. to be made, the extra cost of supplying and installing the regulators being far more than offset by the saving in cables and in the separate supply apparatus.

The central transformer station is situated roughly at the centre of gravity of the main portion of the Autoroute and is equipped with two transformers of 10,000/220 volts, each rated at 80 kw., their two-phase secondaries feeding four Alsthom regulators, each of 33 kw. capacity. The series supply circuits which, when the whole of the main branch is lighted, will supply 79 lamps each, are connected directly to the secondary terminals of the regulators. Under normal working conditions the lamps operate at 137 volts and 2.05 amps.

### Safety Precautions

The security measures which have been introduced into this lighting installation are of interest. They are:—

(1) Having two lamps per column reduces incon-

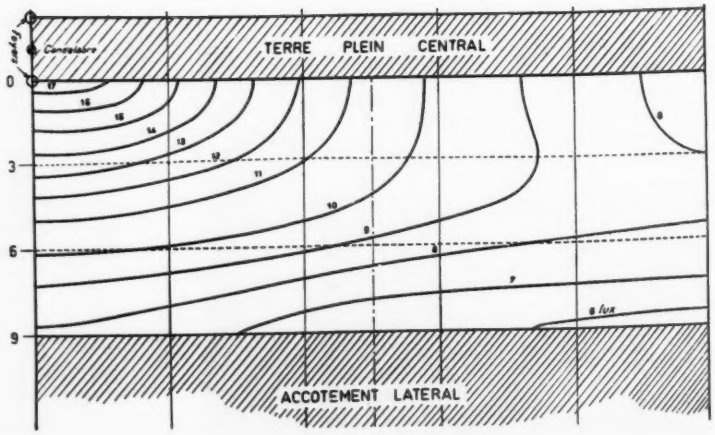



*Fig.* 11. *Isophot diagram for one carriageway.*

venience resulting from the accidental extinction of one lamp.

(2) The use of individual transformers means that one fitting can go out of circuit without disrupting the supply to others on the same circuit.

(3) The use of two circuits provides a safeguard against the interruption of supply caused by accidents to cables or transformers. It also permits the lamps to be extinguished in two stages at say 10 seconds interval so that drivers, though few in number at that time of day, are not given too disagreeable a shock when the lamps are put out.

(4) Finally to reduce the risk (admittedly fairly remote) of a breakdown in any sector each of the transformers and the circuits it supplies is taken from a different feeder coming from a different sub-station.

### General Remarks

On the whole the lighting of the Autoroute is considered by the users of the road to be of a high standard; it is very efficient with no glare and, moreover, is found to be very agreeable by night. The average illumination is between 0.8 and 0.9 lm./ft.$^2$; the distribution of both illumination and road brightness is very satisfactory.

The installation on the first four kilometres of the main branch was completed in four months. The net cost, in round figures, was 6,500,000 francs per kilometre (about £10,000 per mile) for the double carriageway—which seems very reasonable considering all the conditions which had to be met, in particular the doubling up of circuits and transformers. The total cost per column erected complete with all equipment, two lamps and painting, was approximately 155,000 francs (about £155).

On the basis of 3,000 hours use per annum and a net cost of eight francs (2d.) per kwh., the running cost is about 450,000 francs per kilometre (approximately £720 per mile). Since in 1953 at least 2,500,000 vehicles used the first section only of the main branch *by night*, the cost of lighting per km. per vehicle works out at 0.18 francs (about 0.07 pence per mile) which is surely very low and will be reduced still further as more vehicles make use of the Autoroute.

*Fig.* 12. *Showing maintenance in progress from a tower wagon.*

## A New Showroom

The B.T.H. Co., Ltd. has recently opened a new lamp and lighting showroom at Crown House, Aldwych, London. The opening coincides with the seventy-fifth year of the practical electric lamp and the seventy-fifth year of the original partnership of two young scientists, Thomson and Houston, the founders of the company.

During the past 75 years the electric lamp has become so much an accepted part of our everyday life that it took the wartime blackout to remind us how dependent we are upon it. The first exhibition in the new showroom is fittingly devoted to the development of electric lighting since 1879 against a background of lighting through the ages.

A unique collection of electric lamps is on show covering the period 1880 to the present day. The oldest exhibit is a Phoenician oil lamp dated at about 1500 B.C., while the two latest are the new 1-kw. horizontally operated mercury vapour discharge lamp, which has many potential uses in industry, and the 10-kw. projector lamp, the largest tungsten filament lamp made in Britain, which is used in studios where colour films are made.

## The Prime Minister's Portrait

Special lighting effects installed by the Ministry of Works in Westminster Hall in connection with the recent presentation to Sir Winston Churchill of his portrait, painted by Graham Sutherland, included arrangements for floodlighting the picture itself as well as the south end of the Hall for the benefit of Press photographers and newsreel cameras.

Behind a bank of flowers in front of the easel carrying the portrait were fitted three 500-watt silvered reflector lamps. The cue for turning on the floodlighting at that point was the word " portrait," spoken by Mr. Attlee in his presentation speech. Lamps were switched on at a control point concealed beside the eastern corner of the platform. The curtains covering the painting were unveiled by cord and pulleys from the same position.

Chandeliers used in Westminster Abbey for the Coronation service last year were adapted for use in the general floodlighting. Four such fittings were made up, two of them having six 500-watt photographic lamps, and the other two fitted with nine lamps each. In addition, there were four 500-watt spotlights mounted on the window-sills on either side of the ceremonial area.

## Lighting Installation

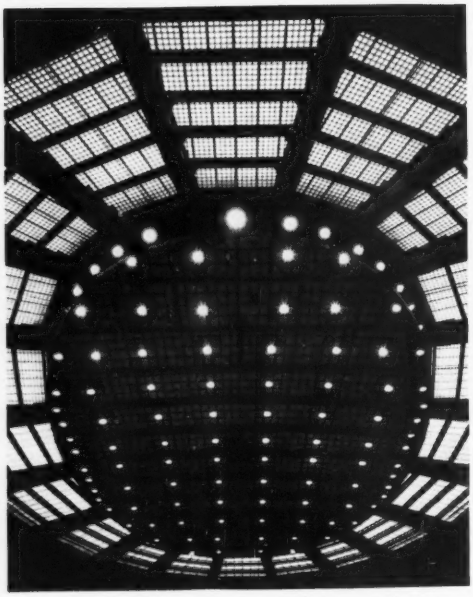
# Westphalia Hall, Dortmund

*Exterior view of hall by night.*

The Dortmund Westphalia Hall, which holds 23,000 visitors, is used especially for sporting events. Ice skating and bicycle race tracks are laid out and give the hall a distinctive character. The solution of the lighting problem was by no means simple, for the illumination of a space occupying about 200,000 cubic yards needed the most careful consideration, particularly in view of the very limited experience available.

In order to obtain an even illumination, the lattice girders supporting the upper part of the roof construction were used to mount 84 projectors of 1,000 watts each: in addition to these, 54 narrow-angle projectors, also of 1,000 watts each, were provided for the illumination of the race track.

Notable features are the absence of glare and the intensities of 35 lm./ft.$^2$ over the arena and 25 lm./ft.$^2$ over the race track. The lighting of the ancillary rooms was an equally interesting problem. Corridors, cloakrooms and staircases, separated from the exterior by glass walls, called for lighting in which the rooms and not the light sources would be the subjects of interest. This result was achieved by means of high-voltage tubing, supported at 8 to 10 in. from the ceiling and enclosed in an anodised aluminium reflector.



*View of ceiling showing lighting projectors and roof glazing for natural lighting.*

The lighting control room is situated on a level with the arena and from it the whole of the lighting is controlled. Dimming transformers provide for any variation that may be desired. There is a safety lighting installation fed from a battery of accumulators by way of a control board.

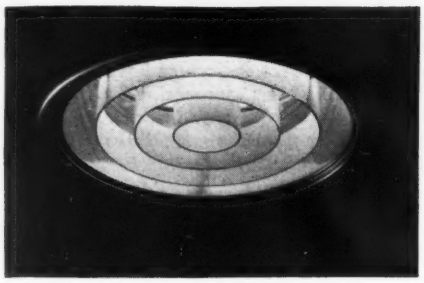
This characteristic structure of steel and concrete, walled in with glass and arched over with a steel framework of 20 main girders, gives a sense of harmony and purpose. As the electrical equipment was planned and executed with the greatest care and attention to detail, and advantage was taken of the latest advances in lighting and installation practice, the aims expressed when the work was being planned, i.e., complete reliability in operation, easy maintenance and suitability, were all fulfilled.

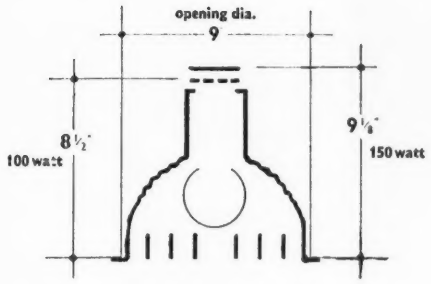
*Part of hall with track lighting projectors only in use.*

**Designed and installed by :**
Emil Neithammer, Stuttgart.

# LUMINAIRES

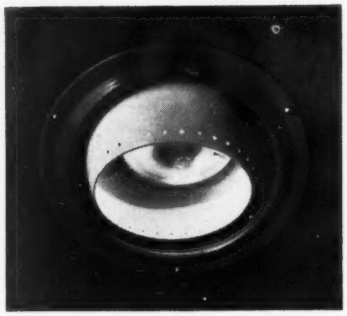
## No. 8

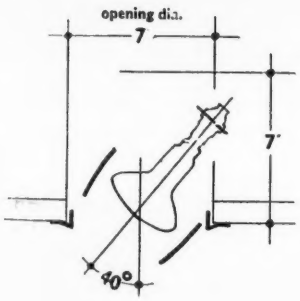





*Recessed display fitting for use with 100- or 150-watt tungsten lamp. The reflectors are of anodised aluminium and the louvres are off-white in colour.*

Price £4 10s.






*Semi-recessed display fitting for use with a 75-watt reflector spotlight and allowing movement through 360 deg. horizontally. The flange is grey and the pierced reflector white in colour.*

Price £4 10s.

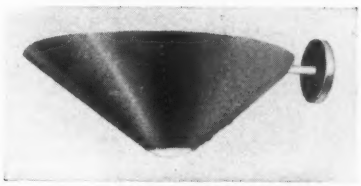
*A suspension fitting allowing a maximum drop of 6 ft. Ceiling plate and counter-weight are finished in black or white. For use with a 100-watt lamp.*

Price £4 11s.
(P.T., 17s. 1d.)

The above luminaires are from a new range by TROUGHTON AND YOUNG (LIGHTING) LTD.

*Simple wall bracket with silk-screened card shade in red or yellow with white stripes. Shade may be turned in any direction. For use with a 75-watt lamp. Another version has a metal reflector.*

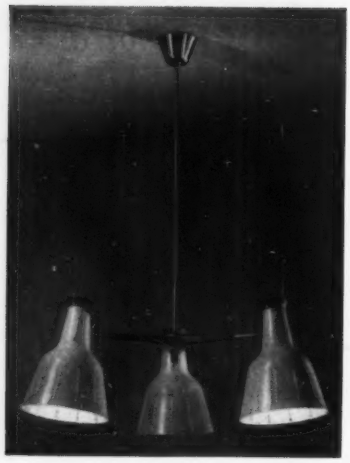
Price £1 7s. (P.T., 4s. 6d.)

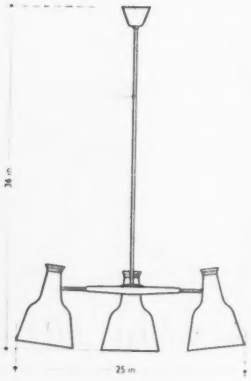


*Wall bracket for 75-watt lamp for indirect lighting. Conical metal reflector is of satin brass, pierced for decoration with a white opal glass cup. Reflector may be completely removed for cleaning by removing two screws without disturbing the wiring or the lamp.*

Price £5 3s. (P.T., 17s. 2d.)

GENERAL ELECTRIC CO., LTD.



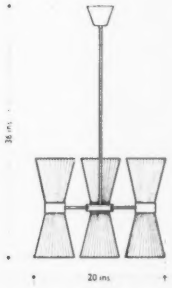



*The metal reflectors, available in black, white or peony red, have a pierced decoration and carry polished brass crowns for added sparkle. The grey wooden ornament which covers the centre body of the satin brass suspension is finished in a neutral grey in order not to detract from the main focus of colour on the reflectors. For three 100-watt lamps.*

Price £15 (P.T., £2 10s.)

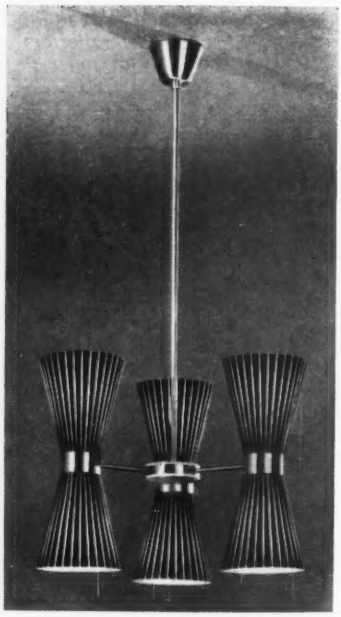
*This three-light fitting combines the utility of a rise-and-fall device with decorative effect. The cord absorber gives an overall length adjustable between 24 in. and 48 in. A handle facilitates raising and lowering. The shades are of card.*

Price £6 18s.
(P.T., £1 3s.)



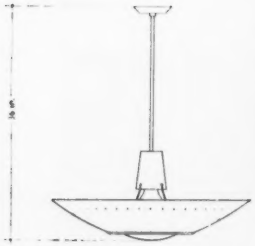

*The diabolo shades are of card or metal each for two 40-watt lamps. The card shades may be red with white polka dots, red with white stripes or black with white stripes. A five-way 10-light version is also available.*

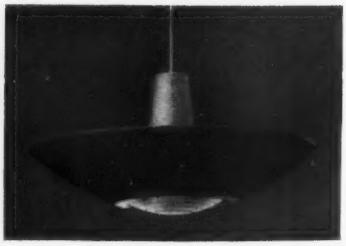
Price £8 18s. 6d.
(P.T., £1 9s. 9d.)



*Wall - bracket for one 60-watt lamp; the glass is similar to that used in a number of pendants. The metalwork is satin brass.*

Price £2 3s.
(P.T., 8s. 1d.)





*This pendant is one of a range of eight luminaires all based on the same constructional principle. Two types of bowl, each available in diameters of 22 in. (200 watt) or 27 in. (300 watt) can be either suspended by a rod or mounted close to the ceiling. The illustration shows the pendant suspension with the smaller size of indirect metal bowl. The bowl, enamelled in lilac grey, carries a stepped prismatic glass lens giving direct downward lighting. The bowl is surmounted by a white enamelled canopy, from which it is easily removable.*

Price £6 13s. (P.T., £1 4s. 11d.)

The above luminaires are all from a new range by the GENERAL ELECTRIC CO., LTD.

# Lighting of a Lecture Theatre

**Description by Dr. L. C. Thomson of the lighting installation in the lecture theatre of the Institute of Ophthalmology.**

When the lecture theatre at the Institute of Ophthalmology was constructed in 1948 the available room in an existing building was one with a ceiling of only moderate height. Thus the back row of the tier of seats was near the ceiling. No special care was given to the design of the lighting system and the fittings at the front of the theatre became a source of glare to members of the audience sitting in the back row. In addition standard fluorescent lamps were used so that each time the lights were extinguished to view a projection from the lantern the lamp cathodes would cool, and when lights were again required there would be a period of flicker which was most annoying to the lecturer and his audience. Owing to the low ceiling the luminance of the lamps immediately over the heads of the audience in the back row of seats was too great for comfort.

When the theatre was redecorated during the summer vacation in 1954, the lighting was redesigned and advantage taken of three existing ceiling beams which run from the front to the back wall of the theatre as can be seen in Fig. 1. The space between these beams was used to accommodate two-lamp 5-ft. 80-watt fittings at an angle and each covered by a glass panel. Four such fittings were installed in each of the three bays formed by the ceiling beams. The angle of the face was so arranged that from no seat in the lecture theatre could the bright surface of the glass be seen at an angle of elevation under 30 deg. The back walls of the fittings were solid and the overall appearance of the lighting as seen by a member of the audience in the back row is shown in Fig. 2.

To overcome flickering after use of the lantern, an "instant start" type of circuit was used in which the lamp heaters were kept at the correct temperature by current from separate transformers.

The new lighting system can be used in any of five different steps by push button control:—(1) All on, (2) First dim position, (3) Second dim position, (4) For demonstrations, (5) All out.

These five stages can be controlled from the lecture bench or from the lantern. In addition a main "on" and "off" button is installed at each of two doorways to the theatre.

(1) *All on.* After the initial period of flicker due to warming of the heaters in the first instance, the "all on" button provides full lighting immediately it is pressed.

(2) *First dim position.* The lights in use at this stage can be seen in Fig. 3. Those over the demonstration bench and the centre fitting of the first seating row are extinguished. The illumination of the theatre is then suitable for showing black and white lantern slides. The small fluorescent lamp in the lectern is tied to the dimming circuit so that it too is at a suitable brightness.

(3) *Second dim position.* For the projection of coloured slides less light in the theatre is necessary and

*Fig. 1. The lecture theatre under full lighting.*

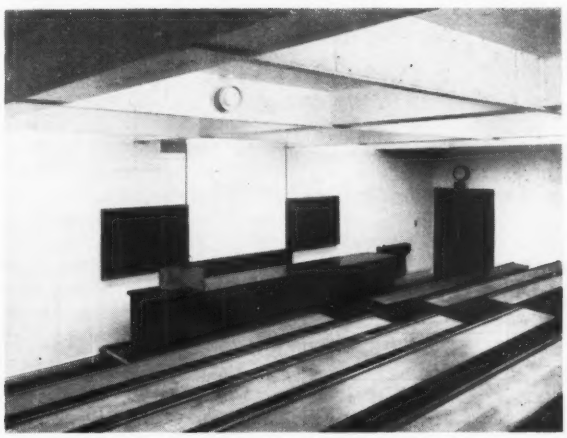


*Fig. 2. Appearance from the back of the theatre.*

*Fig. 3. The lighting set to the first dim position.*

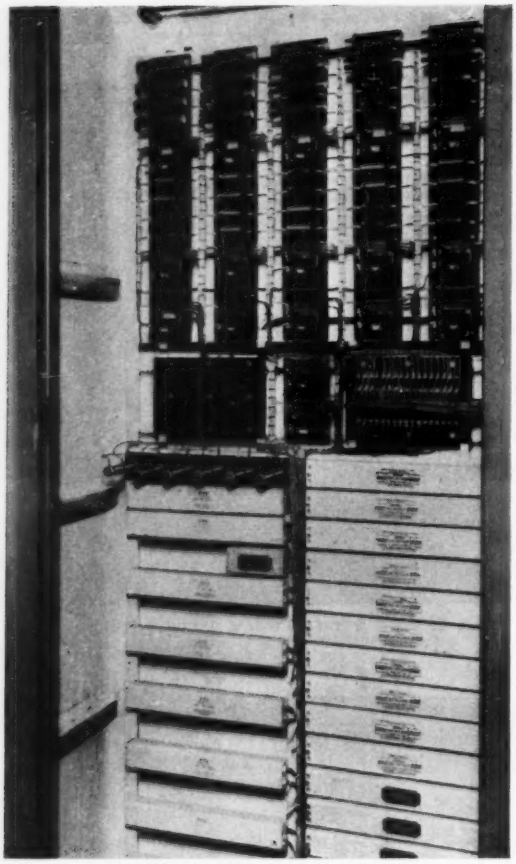


*Fig. 4. The control gear.*

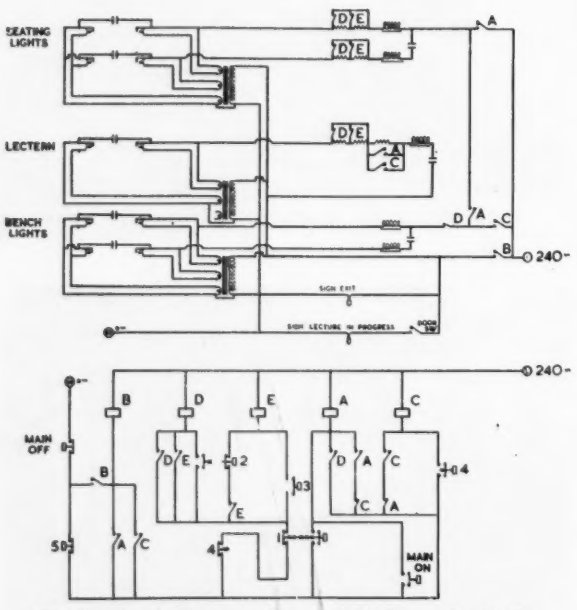



*Fig. 5. Circuit diagram. Upper half shows circuits for the lamps with relay contacts labelled A - E. Lower half shows circuits of the relays themselves with contacts labelled A - E and coils shown as small rectangles labelled A - E. Push buttons labelled 1 - 5 corresponding with the five steps.*

the third stage introduces further resistance and lowers the brightness of the fluorescent lamps another step. It also extinguishes completely the three centre lights.

(4) *For demonstrations.* In this stage the three fittings nearest the lectern bench are in full operation with all others extinguished.

(5) *All out.* The current passing through the heaters of the lamps is not extinguished. The lectern lamp is reduced a further step in luminance.

Any of these five steps can be obtained by either the lecturer or lantern attendant. This is done by a system of relays and the introduction of suitable resistive ballast into the high tension circuits of the lamps. The necessary "electronic brain" is shown in Fig. 4. Extra resistors were added so that the back row of seating lights is permanently dimmer than the rest; this gives evenness of illumination on the benches. Since the wattage dissipated by the dimmed lamps is small, the series resistors for the second dim position can be of 2-watt wireless type. The main "on" and "off" buttons at the doors also control the heater current to the lamps.

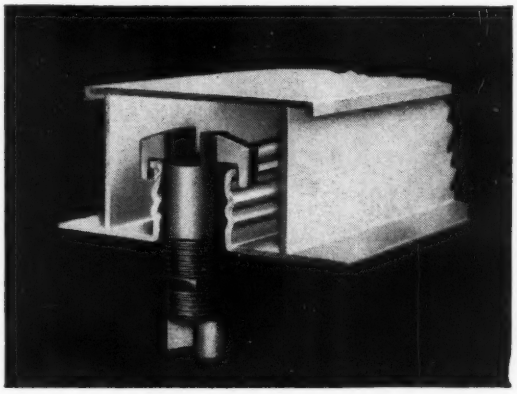
The illumination of the centre of the bench in each row of seats is 60 lm./ft.$^2$. The illumination was also measured across the theatre in the fourth row and rose from 15 lm./ft.$^2$ at the side to 60 lm./ft.$^2$ in the centre. The low value was only found for about 2 ft. from the end of the bench. The average illumination in the first dim position is 2.75 lm./ft.$^2$ and for the second 0.11 lm./ft.$^2$. The illumination on the demonstration bench with full lighting is 80 lm./ft.$^2$ and at the "demonstration" stage is 55 lm./ft.$^2$. The fittings were made by the institute maintenance staff during routine redecoration, and the electrical circuits installed by Mr. G. R. Wright, Institute Electrician.

# New Products

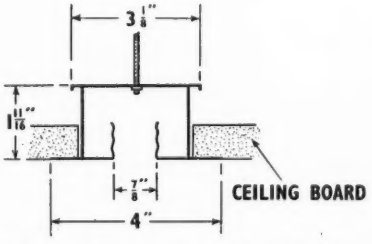
**Invertrunking**

The B.T.H. Co., Ltd., has recently introduced a new trunking system known as "Invertrunking." This is a form of inverted trunking or conduiting, carrying wiring and cables, lighting and other electrical fittings, which may be quickly and simply attached by means of T-bolts.

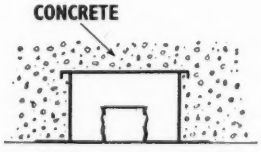
It consists basically of a one-piece aluminium extrusion, which is joined by a channel section where necessary. A spring steel cover fillet completes the section when all wiring is in position; similarly it is only necessary to remove this when alterations to the circuits or fittings are desired. Overall dimensions are—width 4 in., depth 1 11-16 in. Angle, Tee and Crossover sections are available to order.



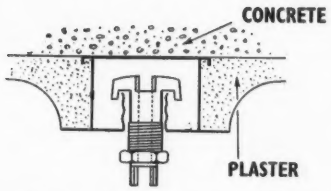
*A section of Invertrunking in extruded aluminium showing a Tee-bolt used to suspend lighting and other fittings.*



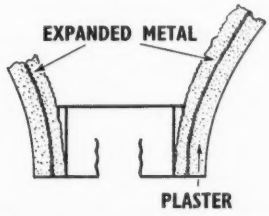

*Showing method of use with ceiling boards.*




*Cast in concrete.*




*Flush on the surface of a primary ceiling and faired off with plaster to form shallow coves.*




*Used in conjunction with expanded metal structures to form the sub-apex of deep plastered coves.*

"Invertrunking" offers a considerable range of flexibility; it may be mounted flush on to beams or structural ceilings, or cast-in-situ (when a protective coat of bituminous paint is necessary). It can be used with plaster, either faired into a shallow cove or used with expanded metal to provide deep coves.

It has been designed with the suspended ceiling in mind, and the broad flanges support standard forms of ceiling tiles, such as those used by Horace Cullum, Anderson Construction Company, and Frenger.

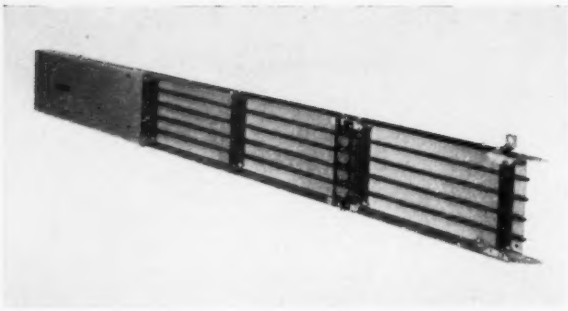
Circuit wiring may be inserted after the ceiling is completed and the use of the new type of B.T.H. connector block, called a Parablock, at intervals in the main wiring allows lighting layouts to be simply and quickly altered.

The price is 4s. 3d. per ft.

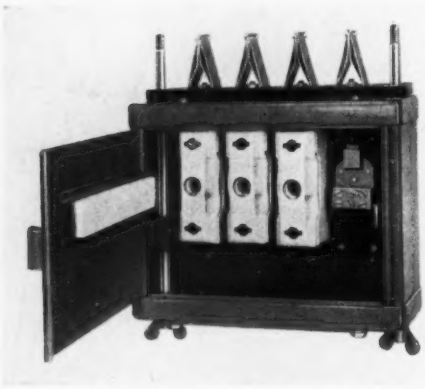
**Medium Duty Trunking**

A medium duty metal-clad distribution system which, while having all the installation advantages of the heavy pattern has a lower amperage capacity, has been designed by The General Electric Co., Ltd. The busbar capacity ranges from 75 to 200 amp per bar. Equipment for the system consists essentially of two, three, or four hard-drawn copper busbars totally enclosed in sheet-steel trunking and supported at frequent intervals by high-grade insulating panels. A visible and substantial external copper earth link is provided on the side of the trunking so that each length of trunking and all fittings can be electrically coupled and connected to give an efficient earth throughout the system. Spring contacts are provided at all outlet points to ensure that tap-off unit casings are earthed efficiently before contacts approach the live bars.

Conductors for the system comprise two, three, or four hard-drawn high conductivity copper bars in sections $\frac{3}{4}$ in. × $\frac{1}{8}$ in. for 75/100 amp capacity, and $\frac{3}{4}$ in. × 3-16 in. for 150/200 amp capacity. Joints, which allow for expansion or contraction under varying temperatures, are at 12 ft. intervals and the bars are all supported at 3 ft. intervals by Bakelite insulators; additional supports being incorporated if fuse tap-off outlets are required at



*A section of G.E.C. medium duty trunking with cover removed to show the four hard drawn high-conductivity copper bars.*



*Showing alignment of H.R.C. cartridge holders with contact fingers on 30-amp. tap-off unit.*

2-ft. centres. The bars are also provided with a radiused edge on the bottom section so that tap-off units can be fitted by an easy "plug-in" action. Each length of trunking is provided with outlets at 2 ft. or 3 ft. intervals to take these "plug-in" tap-off units. Insulating shield plates are fitted in the outlets to prevent accidental contact with the casing. Unused outlets are protected by removable steel-sheet cover plates.

Trunking for the system is in 12 ft. sections of 9⅛ in. × 2½ in. 16 S.W.G. mild steel casing, treated with red-oxide primer as a rust preventive and finished in a glossy battleship grey enamel. It is fitted with overlapping sheet-steel cover plates, secured by rust-proofed screws, so arranged that they can be removed easily without removing the fuse units from the plug-in positions. Each length of trunking is supplied complete with one set of standard fixing brackets, all fish plates, sherardised screws, earth link, covers, insulating panels, and copper conductors with coupling bolts and nuts. Terminal stop ends, conduit or cable and universal entry units, horizontal right-angle bends, vertical right-angle bends, tee and intersection units, similar in section to, and finished to match, the trunking can be supplied. Like the trunking they are supplied complete with all coupling components.

The 30 amp tap-off units for use with the busbar system are supplied in a sheet-steel case with a hinged door, spring catch and padlock plate. Supporting members, of ⅜-in. diameter rustless steel, are fitted with wing nuts and washers and each unit has robust contact fingers. The members are so arranged as to prevent the accidental reversal of phase sequence and form an integral part of the tap-off unit, being threaded at the upper end for screwing into internally tapped sections within the trunking. This permits the securing of the tap-off unit to the system from the underside.

The contact fingers have either heavy copper contacts reinforced by steel springs to maintain high pressure contact with the bars, or contacts of a specially designed extrusion. A moulding is fitted within the tap-off unit to shroud the contact stems and is so designed as to permit the removal of unwanted contact fingers and the strapping of stems together as may be required. Strapping links are supplied as separate items.

Each tap-off unit contains the appropriate number of porcelain fuse bases and solid neutral link, and can be arranged for D.P., S.P., and N.T.P., or T.P. and N. systems as required. For 60 amp tap-off units the construction is similar to that already described with the exception that 60 amp fuse bases and H.R.C. cartridge holders are fitted.

Thirty and 60 amp horizontal tap-off units are generally as described for the vertical unit, but when installed connect to the underside of the trunking in a horizontal position, with the hinged door opening in a downward direction.

**Sealed Lampholder with Built-in Dimmer Attachment**

A new lampholder (3.6 watts), designed primarily to hold lamps with standard miniature Edison screw caps, for use on radio and electronic equipment, is being manufactured by The Plessey Co., Ltd. Of robust construction, the lampholder conforms to B.S. 98 : 1947, and is suitable for use in a panel of any thickness up to a maximum of ⅛ in.

The body of the holder, which is sealed to exclude moisture, is machined from high-quality brass and insulated from the panel. A centre contact of spring-tempered beryllium copper, insulated from the body by a perbunan seal, completes the circuit to the bulb. All metal parts, with the exception of the contact spring, are silver-plated and connecting tags are tinned to facilitate soldering.

Two interchangeable caps are available. The first is a ureaformaldehyde moulding supplied in a wide variety of colours to suit individual requirements. The second is a dimmer cap of entirely new design. This consists of a light alloy diecasting fitting with a plastic filter which is coupled to a shutter. Rotation of the filter, also available in many colours, enables the quantity of light transmitted to be varied from maximum to zero. A smooth action is obtained by the use of a silicone-treated rubber compression ring between the body and the shutter.

**The Lumenated Ceiling**

A new architectural lighting system, believed to be unique in this country, was introduced recently by Lumenated Ceilings, Ltd. (4, Lloyd's-avenue, E.C.3). It consists of a ceiling of corrugated translucent vinyl sheet, supported in a framework of lightweight steel, suspended below fluorescent or tungsten lamps. The plastic sheeting diffuses the light to form a completely luminous ceiling, without glare, high spots or shadow, although the intensity of lighting can range from 20 to 200 lm/ft². Lumenated ceilings are claimed to be the nearest approach to natural daylight of any lighting system yet devised, but the cost is comparable with other "overall" lighting systems and in many cases is considerably cheaper.

The Lumenated Ceiling will be particularly useful where a large area has to be illuminated—such as in restaurants, garages, showrooms, stores and shops, schools, ships, hospitals, offices and factories, etc.—and the ceiling itself,

even when the lights are not in use, always presents a light and attractive appearance. For use in showrooms there is yet a further advantage, as the uniform intensity of lighting is claimed to overcome the usual "mirror" effect of the front windows.

For use in new buildings the ceiling is particularly economical as it is unnecessary to finish the structural ceiling in any way—other than by painting it white. For use in remodernisation schemes it will be necessary to re-whiten the existing ceiling, and the walls above the Lumenated Ceiling, together with all obstructions such as trunking ducts and pipework. It is not necessary, however, to repair defects in plasterwork (except where dust or debris are likely to fall on the ceiling) or, in the case of new buildings, to render a concrete or "pot-tile" ceiling with plaster.

The reflecting qualities of the cavity surfaces are important as the basic principle of the new ceiling is that every part of the cavity will reflect light to other parts, as in an integrating cube.

The Lumenated Ceiling can be erected quickly and simply from a few standard parts without the use of nuts and bolts, and with the minimum of cutting on site. The steel framework, which is specially designed to ensure flexibility in layout, consists of lengths of 22-gauge, mild steel, H section track suspended from the existing ceiling by hangers, and held parallel at approximately 3 feet centres by rigid spacer tubes. The corrugatetd vinyl sheet, supplied in rolls 3 feet wide and up to 25 feet long, is pulled along between the channels of two of the H section tracks and held in position by plastic clips.

The vinyl sheet is .007 in. thick and weighs less than one ounce per square foot and it can be cut easily with scissors or a knife. The corrugations have an amplitude of $\frac{5}{8}$ in. and a pitch of $1\frac{1}{4}$ in. across the full width. To retard the collection of dust, the sheeting is subjected to an anti-static process. When necessary the plastic can be speedily washed and re-processed by a mobile "laundry" run by Lumenated Ceilings, Ltd., which will visit an installation at the most convenient time. The sheeting does not support combustion.

When maintenance is to be carried out in connection with the lighting system, it is a simple matter to withdraw one or more of the sections of plastic sheeting to expose the lighting fittings.

The complete Lumenated Ceiling, including the steel framework, weighs only 12 ounces per square foot. All metal parts are bonderised and heavily stove-enamelled to prevent corrosion.

Fluorescent lamps are generally the most satisfactory light source for this ceiling and, except where excessive plenum depths are encountered, the use of separate reflectors behind the lamps is not necessary.

# Trade Literature

CRYSELCO. LTD., Lighting Department, Kempston Works, Bedford.—A brochure illustrating commerical fittings for use in offices, public buildings, hotels and churches including details and prices. Also a leaflet giving details and prices of the industrial benchlight fittings for mains or low voltage lighting.

SMART AND BROWN (ENGINEERS), LTD., 105, Judd Street, London, W.C.1.—Broadsheet of industrial and commercial fluorescent lighting containing prices and details of luminaires, lamp accessories and control gear. Also a pocket handbook with separate price list of "Hi-Craft" lamps, luminaires and control gear. Both these are obtainable at this firm's works and branches in Manchester, Leeds, Bristol, Birmingham and Spennymoor as well as their London offices.

GEORGE FORREST AND SON, LTD., 30, Osborne Road, London, W.3.—A fully illustrated catalogue with details and prices of the "Forrest Modern" luminaires for table, desk, floor, wall and ceiling.

THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, London, W.C.1.—The "Atlas Technical Handbook AL/104C" dealing in simple terms with the fundamental principles of the fluorescent lamp and tabulating useful data about lamp colours, light output, circuits and control gear, installations and servicing, fault finding and the selection of luminaires for a wide variety of purposes.

THE EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2.—A leaflet giving details and prices of the new "Ediswan" Avon A.C. surface switch socket outlets which are particularly suitable for use in old premises which are being converted to electricity.

HARRIS AND SHELDON (ELECTRICAL), LTD., 31, Stafford Street, Birmingham, 4.—Broadsheet of "Handslite" fluorescent lighting equipment containing details and prices of lighting units, control gear and spotlamps.

ENTHOVEN SOLDERS, LTD., Enthoven House, 89, Upper Thames Street, London, E.C.4.—Product catalogue giving details of flux cored solder wire, solid solders and solder paint. Also a leaflet dealing with the "Superspeed" Soldering Iron.

LINOLITE, LTD., 118, Baker Street, London, W.1.—Leaflet, No. 18A, giving illustrated details and prices of the "Linolite" system of strip lighting to domestic, commercial and industrial lighting schemes.

TROUGHTON AND YOUNG (LIGHTING), LTD., The Lighting Centre, 143, Knightsbridge, London, S.W.1.—A new catalogue illustrating the complete ranges of "Ultralux," "Versalite" and "Mondolite" luminaires. It incorporates new designs added to the ranges during the last year as well as some further new designs now available for the first time; full details and price list in all cases.

# Situations Vacant

A leading firm in the lighting industry has a vacancy for a first-class DESIGNER in its lighting department. Work will be concerned with special decorative fittings designs in both contemporary and traditional styles, and new lighting developments. The post offers attractive prospects and salary for men with initiative, imagination and a sound experience in this field. Apply in writing quoting Ref. D.O. to the Staff Manager, Magnet House, Kingsway, W.C.2.

Street lighting section of manufacturing electrical engineers in City requires ASSISTANT (25/30 years) to handle quotations in sales office. Applicants must have good knowledge of street lighting equipment. Superannuation scheme. Five-day week. Apply stating age, experience and salary to Box No. 880.

Fully trained LIGHTING ENGINEER required for London office. Applicant must be well educated and conversant with modern lighting methods. Apply Senior Lighting Engineer, Ekco-Ensign Electric Ltd., 45, Essex-street, Strand, W.C.2.

JUNIOR TECHNICAL ASSISTANT required for illuminating engineering department of old-established manufacturers of lighting equipment for the preparation of Lighting Schemes, etc. Apply in writing stating age, experience and salary required to Chief Engineer, Technical Service Dept., Holophane, Ltd., Elverton-street, Westminster, S.W.1.

# I.E.S. Activities

### Leeds Centre

At the meeting of the Leeds Centre on October 25 Mr. J. R. Bardsley presented his chairman's address, in which he reviewed the growth and activities of the Centre.

In April, 1937, he said, there were seven members of the I.E.S. in Yorkshire, Cumberland, Northumberland and Durham. Following increasing membership when the Centre had 112 members in May, 1939, the Sheffield Group was formed, to be followed in October, 1941, by the Newcastle Group, when the Centre membership had reached 130.

In February, 1942, Newcastle became an independent Centre, followed by Sheffield the following year. Developments were occurring in the Bradford area, where a Group was established that same month, to be followed by Huddersfield Group in January, 1944. In 1945 a Group was commenced in Halifax, by which time membership had risen to 184. The Groups, however, in spite of the enthusiasm of their members, were later wound up and the members reincorporated in the parent Centre. The Centre, however, still arranges meetings in those towns previously served by the Groups.

Attempts had been made pre-war to establish a Group in the East Riding, but it was not until September 1, 1954, at which time there were only nine members, that this was achieved. To-day, under the chairmanship of Mr. Shackleton and with Mr. Hall as its secretary, the membership has risen to 36, a very worthy achievement in the space of two months. The membership of the Centre is now 213, and Leeds is the second largest Centre in the Society.

Following the address by Mr. Bardsley the President, Mr. E. C. Lennox, repeated his presidential address which was given in London earlier in the month. (See I.E.S. Transactions, No. 1, 1955.)

The fourth meeting of the Leeds Centre this session was held on Wednesday, November 17, in the lecture theatre of the Yorkshire Electricity Board at Bradford. Mr. A. Wilcock was the lecturer, his subject being "Industrial Colour-Matching Problems," a subject of vital interest to the textile industry. There was an attendance of 45, many of the audience being associated with dyehouses. Various demonstrations were used illustrating the effect of using different light sources on coloured materials.

In the discussion which followed, Mr. Stobart, a dyer, asked if the fluorescent lamp could be taken as the answer to colour-matching problems. In reply the lecturer emphasised that various dyes reacted in different ways, dependent upon their bases, and it had been found in practice that certain dyes reacted satisfactorily under the colour-matching lamp, whilst others were matched more effectively under one or other of the colour-matching units.

Further discussion stressed the importance of the surrounds when colour-matching was taking place, pointing out the necessity for the use of neutral decorations at that point.

The chairman of the Centre, Mr. Bardsley, concluded the meeting by expressing the appreciation of all present to Mr. Wilcock for a most informative and instructive paper.

*Mr. J. R. Bardsley (Chairman), Mr. E. C. Lennox (President) and Mr. L. A. Doxey (Retiring Chairman) at the Leeds Centre meeting on October 25, when Mr. Bardsley presented his Chairman's Address.*

### Liverpool Centre

At the Liverpool Centre meeting on November 16 Mr. J. W. Howell gave a lecture on lighting for production.

Whilst progressive manufacturers realise the importance of, and the benefits to be derived from, good lighting there are unfortunately many small firms handicapped by appallingly low levels of illumination and managements which seem to regard any item not spent on the actual product as an unnecessary expense.

Efficiency of machines has been improved but not enough attention is given to providing the worker with adequate lighting to enable him to do his job. Every effort has got to be made to help the worker to increase his output to meet growing demands for products. The most fallible link in the productivity chain is the human factor, which can aid or mar production according to the working conditions. Most workers now enjoy fair conditions in many respects, but the vital matter of seeing conditions is only too frequently forgotten.

The author then reviewed in detail lighting legislation and standards of lighting, and showed how lighting had been used in the textile industry to improve output.

In conclusion he said that well-planned lighting installations are as essential to the production drive as the most delicate and expensive machinery, since without lighting or with indifferent lighting the most carefully planned production plans can be rendered valueless.

### Glasgow Centre

The meeting of the Glasgow Centre on November 4 was notable for the presence of a number of prominent mining representatives, including Mr. W. Rochester, Chief Electrical Engineer, Central East Scotland Area of the N.C.B. The speaker was D. A. Strachan, the N.C.B.'s lighting engineer, who spoke about flameproof equipment. After an excellent paper well presented, Mr. Rochester opened what proved to be a lively discussion. It was noteworthy that Mr. Strachan was always the master of his subject, but it was also obvious that many of the questioners had not a full realisation of the difficulties and conditions which limited the activities of an engineer in the flameproof field.

The paper was an excellent reference paper, and one

*Birmingham Centre Ladies' Night: Mr. and Mrs. F. W. Haynes and Mr. and Mrs. A. G. Penny.*

important point which was brought out was that individually certified F.L.P. items of equipment could not be "married" unless the combination itself was also certified.

The speaker, whose entertaining style had been heard before in Scotland some years ago, merited the cordial vote of thanks which was accorded by both members and visitors.

### Sheffield Centre

There was a good attendance of members and visitors at the November meeting when Mr. T. S. Jones gave a lecture entitled "Lighting for Display" with the aid of demonstrations arranged in a portable shop window.

Although the speaker began by giving a number of basic rules to be obeyed when lighting shop windows and said that this particular subject was rather akin to stage lighting, shop interior lighting was also dealt with.

Lamp positions were discussed first, and many examples of good and bad lighting were shown on slides. Attention was then drawn to the use and misuse of coloured light, the uses of diffused, concentrated and directional light for displaying different types of material, the way in which prismatic refraction of transmitted light can enhance the beauty of glassware and other crystalline displays, the need for certain minimum brightnesses to increase acceptability of artificial lighting for soft goods (particularly where colour discrimination is of importance), and the need for correct interior colour lighting to suit the conditions under which particular goods may afterwards be used.

An interesting and lively discussion took place at the conclusion of the lecture, in which several speakers emphasised the need for more co-operation between lighting engineers working in this field and architects and window-display people. Further, it was felt that windows should have a certain amount of basic equipment so that a good window-dresser could get almost any effect he wished to create.

A hearty vote of thanks to Mr. Jones was proposed by Mr. J. A. Whittaker.

# I.E.S. Forthcoming Meetings

## LONDON

**January 11th**

Lecture. "Fading and Related Effects associated with the Radiation from Light Sources," by B. S. Cooper. (At the Royal Society of Arts, John Adam Street, W.C.2.) 6 p.m.

## CENTRES AND GROUPS

**January 5th**

EDINBURGH.—"Street Lighting Lantern Design," by T. M. Christie. (At the Y.M.C.A. Small Hall, 4, Queen Street, Edinburgh, 2.) 7 p.m.

NEWCASTLE.—Presidential Address, by E. C. Lennox. (At the Liberal Club, Pilgrim Street.) 6.15 p.m.

SWANSEA.—Informal Meeting. Three papers followed by a discussion. (At the South Wales Electricity Board's Demonstration Theatre, The Kingsway, Swansea.) 6.30 p.m.

**January 6th**

CARDIFF.—"Studies in Interior Lighting," by J. M. Waldram. (At the South Wales Electricity Board's Demonstration Theatre, The Hayes, Cardiff.) 5.45 p.m.

GLASGOW.—"High Bay Lighting," by F. Jones. (At the Institute of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 7.30 p.m.

NOTTINGHAM.—"Recent Studies in Glare," by R. G. Hopkinson and P. Petherbridge. (At the Demonstration Theatre of the East Midlands Electricity Board, Smith Row, Nottingham.) 6 p.m.

**January 7th**

BATH AND BRISTOL.—"Studies in Interior Lighting," by J. M. Waldram. (At the Royal Hotel, Bristol.) 6.15 p.m.

**January 14th**

BIRMINGHAM.—Annual Dinner. (At the Midland Hotel, Birmingham.)

**January 18th**

GLOUCESTER AND CHELTENHAM.—"Modern Trends in Picture Presentation," by F. W. Capbell. (At The General Electric Co. Ltd., 2, St. Aldate Street, Gloucester.) 6.30 p.m.

LIVERPOOL.—"The Application of Light in Medicine." (At the Liverpool Engineering Society, 9, The Temple, 24, Dale Street, Liverpool.) 6.30 p.m.

**January 19th**

NORTH LANCASHIRE.—"Lighting for Enjoyment," by T. O. Freeth. (At the Demonstration Theatre of the North Western Electricity Board, 19, Friargate, Preston.) 7.15 p.m.

TEES-SIDE.—"The Application and Maintenance of Discharge Lamp Installations," by J. J. French. (At the Cleveland Scientific and Technical Institute, Corporation Road, Middlesbrough.) 6.30 p.m.

**January 20th**

MANCHESTER.—"Lighting for Decoration," by P. Corry and A. E. Hurst. (Joint meeting with the E.A.W.) (At the Demonstration Theatre of the North Western Electricity Board, Town Hall, Manchester.) 6 p.m.

**January 24th**

LEEDS.—"The Use of Films in the Textile Industry," by Frank Hill. (At the E.L.M.A. Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 6.15 p.m.

LEICESTER.—"Contemporary Lighting," by K. S. Morris. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 6 p.m.

STOKE-ON-TRENT.—Annual Dinner.

**January 28th**

BATH AND BRISTOL.—"Lighting for Photography," by R. W. Unwin. (At the South Western Electricity Board, Lecture Theatre, Old Bridge Street, Bath.) 7 p.m.

BIRMINGHAM.—Symposium of Papers: "Shop Window Lighting," by R. C. Pennington; "Colour in Interior Decoration," by J. B. Horniblow; "Aspects of Industrial Lighting," by F. C. Johnson; "Aspects of Museum Lighting," by N. W. Bertenshaw. (At "Regent House," St. Phillips's Place, Colmore Row, Birmingham.) 6 p.m.

NEWCASTLE.—Dinner Dance. (At the County Hotel, Neville Street.)

**January 31st**

LEEDS.—"Prescribing for Seeing," by M. L. Berson. (At the Lecture Theatre of the Yorkshire Electricity Board, Ferensway, Hull.) 7.30 p.m.

# Book Review

*"Textbook of Illuminating Engineering," by J. W. T. Walsh, O.B.E., M.A., D.Sc., F.I.E.S. Sir Isaac Pitman and Sons, Ltd. Pp. xii + 202; figs. 137. Price 28s. (Second edition).*

To those who already know this excellent textbook of the elements of illuminating engineering no further commendation is necessary. The first edition, which was prepared at the request of the Illuminating Engineering Society, has been widely used, and must have contributed greatly to the rising standard of young men learning the job of lighting. Anyone who has not read it, however well versed in the subject he feels himself to be, can hardly fail to profit by studying it.

Dr. Walsh has a great flair for setting down his ideas in terms which are at the same time simple and precise: this is very valuable in a subject which ranges from mathematics of fair difficulty at one end of the scale to pure art at the other. Often the mathematician finds himself annoyed by the rather vague terms in which the decorative side of the subject has to be expressed, and the artist finds himself exasperated by the accuracy with which the mathematical and engineering aspects can be dealt with. This book does not attempt to deal in detail with the aesthetic side, but it examines in terms which can be followed by most of us the engineering and physiological bases of lighting. It was written primarily for students, and in particular for students preparing for the Intermediate Grade Illuminating Engineering Examination of the City and Guilds of London Institute. But the term "student" should not be interpreted too narrowly; many people who have worked in this field for years will find that the book presents rational reasons for lighting practices which are now commonplace: they may also find that some of these traditional practices are not necessarily the best ones. In this new edition some revisions have been made to accord with revisions in the syllabus of the City and Guilds Examination; but in addition there is included a new chapter on colour, largely for the benefit of candidates offering illuminating engineering as a subject in the final part of the examination of the Institution of Electrical Engineers. In this chapter, starting with the two experimental facts that a colour can be matched by a mixture in suitable proportions of three different lights, and also with the additivity law, Dr. Walsh goes briefly through a description of the Donaldson colorimeter to an account of the C.I.E. system, the chromaticity diagram and the photo-electric spectrophotometer. For most people these are matters of almost terrifying complexity and one wonders whether an account of only nine pages, however well written, is worth while; but certainly at the stage of study expected of the readers of this book a more detailed account would be unjustified. The establishing of some general principles and the stimulation of thought must be the main objective.

When a further edition of this book is published, as one feels it inevitably must be, the author might consider including a short bibliography for further reading.

W. R. S.

# Correspondence

## Visual Comfort

To the Editor, LIGHT AND LIGHTING

Dear Sir,—A word or phrase can have a meaning without that meaning being capable of precise definition. When I look at a scene which is both pleasing in itself and well lit I experience a pleasant sensation. This sensation may usefully be described as a combination (among other things) of aesthetic pleasure and visual comfort. In a very rough sense we all know what is meant by these terms, but I do not think that it is possible to define either in a general sense.

"Lumeritas" holds that it is possible to experience one without the other, but I am inclined to doubt whether this is true. One of the examples he quotes, that of driving into a beautiful sunset, leaves me unconvinced, since one is not looking at the sunset when trying to make out details of the road ahead. In such a case the sunset ceases to be the view looked at, and becomes merely a peripheral source of discomfort. In looking at a scene which contains elements of great beauty as well as glaring sources I am sure that the maximum of aesthetic pleasure is not achieved until the discomfort has been removed by shading the eyes or in some other way.

If one does try to define the distinction between the two terms I have used, it seems to be that visual comfort is the purely negative sensation of "absence of discomfort" (a definition which "Lumeritas" has already rejected as being too limited for what *he* means by "visual comfort"), and aesthetic pleasure is a more positive feeling, implying the presence of some other factor.

I suggest that the difficulty lies in the feeling that visual comfort can be experienced in purely functional surroundings, whereas aesthetic pleasure implies some specific "artistic" intent. I had thought that Corbusier had disposed of this distinction in 1923.—Yours, etc.,

*Lancing.* P. A. JAY.

To the Editor, LIGHT AND LIGHTING

Dear Sir,—Mr. Jay and I must agree to differ as to whether or not one can be comfortable in seeing without any accompaniment of pleasure evoked by the scene surveyed. The scene before me as I write—an appallingly littered desk—has no aesthetic merit and gives me no pleasure at all. But, as I am not conscious of any visual discomfort, I must conclude I have visual comfort.

These last words are my answer to the penultimate paragraph of Mr. Jay's letter—in which, however, he mistakenly says I have rejected "absence of discomfort" as sufficiently defining visual comfort.—Yours, etc.,

"LUMERITAS."

## Picture Lighting

To the Editor, LIGHT AND LIGHTING.

Dear Sir,—I have been trying to buy an aesthetic fitting to light an oil painting in my home. It seems an impossible task. I have been offered only one fitting which, my dealer assures me, is the only standard type manufactured. This is a heavy, long-armed, ugly and obtrusive thing, more resembling a vacuum-cleaner attachment than a lighting fitting.

I have made inquiries at a lighting bureau who tell me that, apart from a spotlight (and I refuse to have holes cut into *my* ceiling or, alternatively, wire crawling up my wall), I may be able to get a fitting specially made for me. I want neither. I want to be able to go to my dealer and be offered a choice of fittings which can be easily fitted and which are inconspicuous. We are always being advised to have better lighting in our homes but when are the manufacturers going to help us to do so? Meanwhile, I shall continue to admire my painting by sun- or torch-light.—Yours, etc.,

*London.* CLAIRE JACOBS (Mrs.).

# POSTSCRIPT By "Lumeritas"

According to a recent note, in the daily Press, our noses as well as our eyes can now be stimulated by our electric lamps. "Experts in the perfume industry have discovered that the heat of an electric light bulb is one of the best methods known to bring out the full power of a scent. Now the British perfume industry is going in for scents for light bulbs in a big way. It has designed special burners to fit on the bulbs . . . then, when the light burns, the perfume spreads through the room in a short while." Were it not that poetry has long since gone out of fashion, it might not be long ere some contemporary parodist of the Immortal Bard would be writing—

What's in a name? that which we call a lamp
By any other name would smell as sweet.

Mention of "contemporary" brings to mind some of the idiocies which are perpetrated under this label. I say nothing of certain artificial lighting fittings constructed of assorted odds and ends and better called "con-extemporary": not that words fail me—although polite ones do! What I now have in mind is some of our new school buildings and the windows thereof. I frequently see one of these "functional" structures—which is not atypical—wherein the architect has extended the windows to within a few inches of the floor. Now, in theory, this is all very well, for the lower the sill the better the ceiling is likely to be lighted. But classrooms have to be warmed in winter and, in the school I am considering, there are radiators reaching to conventional sill height and extending across almost the whole width of the windows. These radiators have to be unusually large because about half of their heat output goes straight out of the windows against which they abut! Thus, not only is much heat wasted (at the cost of the ratepayers), but the lower part of the glazing is almost totally obstructed so that its lighting value is practically nil! Never mind: the façade has the "new look"—it is delightfully (or frightfully?) modern—and its a mad world anyway.

Is there any relation between industrial lighting practice and the rate of economic growth of a country? This question arose in my mind after reading two articles in immediate succession—one of them, the article in the last issue of this Journal on interior lighting in Italy, and the other an article by an economist on the comparative rate of economic growth of different countries since the war. In Italy, it appears that industrial illumination levels are well below those recommended in Britain and in the United States. Levels exceeding five to 10 lm/ft² are uncommon, and electricity for lighting is taxed and expensive. According to the economist, however, Italy is sustaining a rate of economic growth which is about the highest in Europe—very much higher than that of Britain and also higher than that of the United States. At the rate things are going now, says the economist, Italy's standard of living will be doubled in 20 years and will overtake ours within 15 years. Industrial productivity in Italy does not seem to be restricted by her lower standards of lighting, and although this productivity depends, of course, on a number of other "factors" besides artificial lighting—as does our own industrial productivity—can it be that we are not reaping all the possible benefits of our higher lighting standard, either because there are other brakes on productivity or because easing work is breeding love of ease rather than willingness to do more work? A good standard of living—which includes good lighting—can only be maintained if it is earned. Good lighting must yield more than comfort if industry is to afford it. I do not believe that industrial lighting generally in this country has yet reached a standard such that its potential aid to productivity is a maximum, but nor do I believe it is still poor enough to be one of the major factors responsible for our comparatively slow rate of economic growth. I believe that in the present state of lighting we could do better if we would, and that the productive value of still better lighting will only be demonstrable when the will to work is somehow strengthened.

The Court of Common Council of the City of London is evidently not of the opinion that continuous artificial lighting is a satisfactory—or at any rate a satisfying—substitute for natural lighting, for the Court has just rejected a plan for the development of a 40-acre City site because the proposed buildings would be lacking in amenities and natural daylight. Another, and perhaps the most cogent, reason for the rejection was that the scheme would involve the Corporation in vast expenditure for acquisition of the area. Certainly the scheme was an ambitious one: it proposed that factories, warehouses and offices should be built to a height of 45 ft. above ground level and be connected by bridges to form a terrace for further offices and flats, rising to a maximum height of 360 ft. To carry out the project would have cost more than £50,000,000. One member of the Council thought that, whether we like it or not, the scheme showed the shape of things to come; but the City is not prepared to let them come yet if they entail too great a sacrifice of daylight.

Another Christmas has passed, and I expect that among the cards of greeting my readers received there were—as among mine—some picturing the traditional festive candle. I cannot imagine the candle ever being supplanted by a modern artificial light source in Christmas card designs. Yet the candle is a simple object of no more intrinsic beauty than modern lamps. But modern lamps are too sophisticated to serve as symbols of the genial informality of Yuletide. Coloured miniature electric lamps have, indeed, largely ousted candles from Christmas trees and, maybe, representations of them have a future on Christmas cards—but not the general service lamps! However, no more of Christmas—the New Year is with us, and may it be a happy one for all readers of this Journal.